Hepatic injury[1]

Trauma hepático

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ABSTRACT
Hepatic trauma occurs in approximately 5% of all admissions in emergency rooms. The anatomic location and the size of the liver make the organ even more susceptible to trauma and frequently in penetrating injuries. The American Association for the Surgery of Trauma established a detailed classification system that provides for uniform comparisons of hepatic injury. Diagnosis of hepatic injury can be sometimes easy; however the use diagnostic modalities as diagnostic peritoneal lavage, ultrasound and computed tomography allow faster and more accurate diagnosis. Nonoperative management of the hemodynamically stable patient with blunt injury has become the standard of care in most trauma centers. Few penetrating abdominal lesions allow conservative management; exceptions can be some penetrating wounds to right upper abdominal quadrant. Operative treatment of minor liver injuries requires no fixation or can only be managed with eletrocautery or little sutures. Major liver injuries continue, despite technical advances, a challenge to surgeons. Many procedures can be done as direct repair, debridement associated to resections, or even in more severe lesions, packing. This constitutes a damage control which can allow time to recovery of patient and decreasing mortality shortly after trauma.
Key words: Injury. Liver. Hepatic Trauma.

RESUMO
O trauma hepático corresponde a aproximadamente 5% das admissões das salas de urgência. A localização anatômica do fígado e o seu tamanho o tornam mais susceptível ao trauma contuso e freqüentemente às lesões penetrantes. A associação Americana para a Cirurgia do Trauma estabeleceu uma classificação detalhada, o que possibilita comparações uniformes do trauma hepático. O diagnóstico destas lesões pode ser muitas vezes fácil, contudo a utilização de modalidades diagnósticas como o lavado peritoneal, a ultrassonografia e a tomografia computadorizada, permite o diagnóstico mais rápido e acurado. O tratamento conservador não operatório do trauma hepático contuso em pacientes com estabilidade hemodinâmica tornou-se padrão na maioria dos centros de trauma. Poucas lesões penetrantes do abdome permitem o tratamento conservador. As exceções podem ser justamente aquelas localizadas no quadrante superior direito do abdome que atinjam apenas o fígado. O tratamento cirúrgico de pequenas lesões hepáticas geralmente necessita de nenhum reparo ou podem ser tratadas com cauterização ou pequenas suturas. As lesões mais graves, a despeito dos avanços tecnológicos, constituem ainda um desafio aos cirurgiões. Muitos procedimentos podem ser realizados como: simples suturas, ressecções associadas a desbridamentos ou mesmo em lesões ainda mais graves, o empacotamento. Este constitui o controle do dano, o qual pode permitir a recuperação do paciente com diminuição da mortalidade precoce após o trauma.
Descritores: Injúria. Fígado. Trauma. Trauma Hepático.

Introduction

Hepatic trauma occurs in approximately 5% of all admissions in emergency rooms[1]. The anatomic location and the size of the liver make the organ even more susceptible to trauma and frequently in penetrating injuries. Motor vehicle accidents are the most common etiology for a blunt liver injury followed by pedestrians and car collisions, falls, motorcycle crashes and penetrating injuries. Technical advances in the last decades resulted in more accurate diagnosis and in better treatment both operatively and nonoperatively. However, serious injuries of the hepatic parenchyma associated or not to vascular injuries continue to be a challenge even to experienced surgeons. Therefore, despite of the progress, mortality rates are still high in liver trauma.

Classification of liver injuries

Uniform classification, easily accessible and of fast interpretation is essential to the comparison of efficacy of management in distinct times or in different institutions. It

allows comparisons between injuries of similar complexity in both operatively and nonoperatively treatments. The AAST (American Association for the Surgery of Trauma) established a detailed classification system[2] that has been adopted as a reference in the world literature and has been included in many Brazilian articles (Chart 1).

CHART 1 - Grade of lesions and injury desccription

	Grade	Injury Description
I.	Hematoma	Subcapsular, nonexpanding, < 10cm surface area
	Laceration	Capsular tear, nonbleeding, < 1cm parenchymal bleeding
II.	Hematoma	Subcapsular, nonexpanding, 10 to 50% surface area Intraparenchymal nonexpanding < 10cm in diameter
	Laceration	Capsular tear, active bleeding; 1-3cm parenchymal depth < 10cm in length
III.	Hematoma	Subcapsular, > 50% surface area or expanding; Ruptured subcapsular hematoma with active bleeding; Intraparenchymal hematoma > 10cm or expanding
	Laceration	> 3cm parenchymal depth
IV.	Hematoma	Ruptured intraparenchymal hematoma with active bleeding
	Laceration	Parenchymal disruption involving 25% to 75% of hepatic lobe
V.	Laceration	Parenchymal disruption involving > 75% of hepatic lobe
	Vascular	Justahepatic venous injury (i.e., retrohepatic vena cava)
VI.	Vascular	Vascular avulsion

Inicial management

The initial management to trauma patient with potential hepatic lesion has been even more performed in our country according to "Advanced Trauma Life Support"[3]. The initial goal is the patient resuscitation. Once stabilized the physical examination is conducted. It is important to emphasize that physical exam in initial management can not lead to the diagnosis of many internal lesions. Intra-abdominal injury may indeed be missed up to 43% at this time[4]. Therefore, in patients with benign physical exam, it is important further evaluations either by serial exams or radiologic methods.

Diagnosis

Diagnosis of intra-abdominal injury can be rapidly done when there is hemodynamic instability, unequivocal signs of peritonitis, ongoing abdominal distension and penetrating injuries. However, frequently a rapid diagnostic modality must be employed. Diagnostic peritoneal lavage (DPL) and focused abdominal sonography for trauma (FAST) are largely used nowadays. DPL is safe and accurate for determining the presence of intraperitoneal blood, mainly when performed with the open technique. It remains a useful tool in patients who have altered sensorium and remain hemodynamically unstable and in institutions in which there is no availability of ultrasound or computed tomography. Therefore, DPL has been replaced in most trauma centers by ultrasound and, in more stable patients, by computed tomography scanning[5]. The FAST exam has high sensitivity and is largely applied as a triage tool to detect hemoperitoneum. Its sensitivity in grade III and higher liver injuries can reach up to 98%[6]. Although volumes less than 400 ml can be rarely seen, fast exam has played a key role in trauma, mainly in unstable patients which changes subsequent management in appreciable number of patients[7]. When the patient, by the other side, presents a suspicious of intra-abdominal lesion and is hemodynamically stable, computed tomography (CT) is the method of choice. CT scan presents today a large impact on diagnosis and management of patients with lesions from blunt abdominal traumas. It is important to establish prognostic criteria allowing decisions for conservative or surgical treatment[8]. Laparoscopy has been indicated to diagnose penetration of penetrating trauma. Therefore, its use in the treatment of lesions is still controversy. In selected patients laparoscopy can be used to repair hepatic injury[9].

Treatment

Today, treatment of hepatic lesions takes in account mainly two aspects: hemodynamically stability and the mechanism of trauma (blunt or penetrating).

Nonoperative management

Nonoperative management of the hemodynamicaly stable patient with blunt injury has become the standard of care in most trauma centers including many of them in this country. Some findings favor this treatment: up to 80% of liver injuries have stopped bleeding by the time of laparotomy and additionally, bile duct injury rarely results in abdominal infection[10]. Although initially this therapeutic modality was more prevalent in pediatric population by the mid 1980s and early 1990s reports of nonoperative management to adult liver trauma patients surfaced. It is important to emphasize that to perform this procedure some general rules must be observed: the patient needs to be kept in an intensive care unit for continuous monitoring, cannot exhibit signs of peritonitis and must be

hemodynamically stable without a significant transfusion requirements. It is accepted that if transfusion needs surpass half of total blood volume, the treatment has failed and celiotomy is indicated. High grade lesions associated to large hemoperitoneum are not contraindications to conservative management. However, they are associated to significant morbidity and failure rates are higher to grades IV and V (14 a 52 %) than grades I to III (3 to 7,5%)[11, 12]. Few penetrating abdominal lesions allow conservative management. Peritoneal cavity penetration is still the standard indication to exploratory celiotomy. Therefore, some authors adopt selective nonoperative management to penetrating wounds to right upper abdominal quadrant[13]. This procedure must be performed only in centers with close continuous monitoring resources and immediate operating room availability.

Complications

Most patients with blunt nonoperative liver injuries have uneventful course. Therefore, surgeons must be prepared to promptly make the diagnosis and treat the complications. One of the most common complications is bile leak. Abdominal pain, tenderness or distention, intolerance to feeding and fever can suggest a bile leak. CT evaluation with percutaneous drainage generally solves the problem. Abscess is not a frequent complication and can be managed by CT-guided drainage too. Hemobilia is uncommon and occurs in less than 3% of liver injuries[14]. It must be remembered in all patients sustaining upper digestive hemorrage with previous hepatic trauma. The magnitude of this bleeding may result in life-threatening complications.

Operative management

Many minor hepatic lesions can be encountered in penetrating trauma or due to other causes as patient instability. Upon opening the peritoneal cavity, stopping uncontrolled hemorrhage must be the initial priority. Before treating minor liver lesions, peritoneal cavity must be extensively inspected for injury, including hollow and solid viscera. Most of minor liver injuries do not require fixation and nonbleeding wounds does not need to be manipulated. Small wounds of the liver parenchyma can be managed with eletrocautery or little sutures. Omentum strips can anchor those sutures. Patients sustaining major hepatic trauma are generally hemodynamically unstable and requires urgent celiotomy. Once abdominal cavity is reached, hemoperitoneum must be evacuated. If bleeding persists after manual compression, Pringle´s maneuver is then performed. Direct suture to control parenchymal bleeding is generally the choice to grade III and IV to liver lacerations. Omental packing can be used too. Deeper lacerations of the hepatic tissue provide a challenge for the surgeon. Balloon tamponade or Foley catheter can be inserted in the penetrating tract. Anatomic resections associated to debridement may be necessary, mainly in large devitalized portions when the injury promoted the resection already or the lesion is restricted to a lobe. Resections were widely employed in the past but associated with high morbidity. Hepatic transplantation has been successfully reported, but it does not constitute a reality to most of the countries of the world. Perihepatic packing is today the most accepted method to management of major liver injuries. The decision to pack must be made early in the exploration in order to provide better chances to survival of liver trauma patients. Abbreviated and extremely necessary procedures only done to keep patient alive, like packing are called “damage control”. Many major liver injuries and progressive coagulopathy are the most frequent indication for damage control[15]. The damage control process requires mature surgical judgement. Meticulous management of the open abdomen is also crucial to limit associated morbidity. Accordingly, recognizing failed surgical control of bleeding and the need for re-exploration is essential for the success[16]. The timing of packing removal continues controversial. The main goal after packing is to correct acidosis, hypothermia and coagulopathy. Generally it can be achieved within 24 to 48 hours. After this time intra-abdominal sepsis becomes greater. Krige et al reported an 83% incidence of developing sepsis in patients after three days of packing versus 27% in patients with less than three days[17]. Recently angiographic embolization has become part or therapeutic arsenal. It has been proved to be a safe and effective method for controlling hemorrhage in both blunt and penetrating liver injuries[18, 19]. Finally, it is important to keep in mind what Trunkey emphazises in his recent publication about hepatic trauma: “The surgeon need to include all components of the surgical armamentarium into their treatment of severe liver injuries and add that complications following nonoperative management are currently annacceptable”[20].

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