Closed Liver Injury

Deena C. Casiero, MD[a,b,c,d,e,*]

KEYWORDS

• Blunt abdominal trauma • Closed liver injury • Nonoperative management
• Liver injury grading scale • Diagnostic imaging • Return-to-play guidelines

KEY POINTS

- The liver is the most commonly injured organ in blunt abdominal trauma.
- Physical examination findings may be subtle or absent in patients with underlying liver injury.
- CT is the test of choice in hemodynamically stable patients.
- Liver injuries are graded I–VI as identified on CT scan or at the time of surgery.
- Higher grades of injury are associated with higher morbidity and mortality.
- Hemodynamically stable patients, regardless of grade of injury, are generally treated nonoperatively with close observation in a monitored setting.
- Unstable patients usually undergo urgent laparotomy.
- There has been a paradigm shift toward nonoperative management in hemodynamically stable patients, which has led to a decrease in mortality in these patients.
- Return-to-play guidelines do not exist for patients who suffered a closed liver injury.

INTRODUCTION

Abdominal trauma is a rare but potentially fatal occurrence in sports-related activity. Up to 10% of reported abdominal injuries are caused by trauma during athletic events.[1,2] The liver is the most commonly injured organ in blunt abdominal trauma.[3] Contact and collision sports, such as rugby, soccer, and football, account for most closed liver injuries caused by direct trauma to the abdomen.[1,2] Noncontact sports, such as skiing and snowboarding, can cause liver trauma secondary to a deceleration mechanism.[2]

Most closed liver injuries are minor and can be treated nonoperatively with observation alone or with adjunctive treatment using arteriography and embolization of

Disclosures: None.
[a] ProHEALTH Care Associates, 2800 Marcus Avenue, Lake Success, NY 11042, USA; [b] USA Seven's Women's Rugby, Arapahoe Avenue Boulder, Colorado 80302, USA; [c] Hofstra University, Fulton Avenue, Hempstead, NY 11549, USA; [d] US Open Tennis Championships, Flushing Meadow, Corona Park Road, Flushing, NY, USA; [e] New York Islanders, Hempstead Turnpike, Uniondale, NY 11553, USA
* 2800 Marcus Avenue, Suite 102 Lake Success, NY 11042, USA.
E-mail address: Dcasiero@prohealthcare.com

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bleeding vessels.[3–15] As few as 10% to 14% of patients with liver injuries require operative intervention due to hemodynamic instability or failure of nonoperative management.[7,16] Because of the potentially fatal nature of some closed liver injuries, it is imperative that sports medicine physicians be adept at evaluating and appropriately triaging these injuries. The goal of this article is to review the mechanisms of injury, signs, symptoms and the appropriate referral of potentially fatal closed liver injuries.

MECHANISM OF INJURY

There are several pathophysiologic mechanisms that can occur during sports-related trauma that may result in closed liver injury. The application of blunt forces exerted against the anterior abdominal wall can cause compression of the underlying viscera against the posterior thoracic wall or the vertebral column. This can result in crush injuries that cause subcapsular or intraparenchymal hematomas in the underlying liver.[1,17] Sports that involve high-intensity acceleration and deceleration forces can cause lacerations of the liver at its points of attachment to the peritoneum or stretch injuries to the intima and media of nearby arteries.[1,17]

SIDELINE EVALUATION

Sports medicine physicians on the sidelines of athletic events may be charged with trying to discern benign abdominal wall injuries from potentially fatal closed liver trauma. This is a challenging task because most severe abdominal injuries have a subtle initial presentation. In most cases, the definitive diagnosis can only be made in the emergency room or with advanced imaging. The decision to allow athletes to return to play versus removed from the competition and transported to a hospital for further evaluation, however, is in the hands of sports medicine physicians, highlighting the importance of the sideline physician's comfort level with evaluation and management of closed liver injuries (**Box 1**).

As with most athletic injuries, the mechanism of injury, history, and physical examination are essential parts of the diagnostic puzzle.

HISTORY

- Was it a direct blow to the abdomen?
- Was it a deceleration mechanism?
- Where is the pain? (right upper quadrant, right chest wall, right flank pain, or right shoulder/neck pain due to radiating pain from diaphragmatic irritation)
- Did it start immediately or develop slowly over time?
- Is it focal or generalized? (Localized abdominal pain can occur with abdominal wall injury whereas generalized abdominal pain is more concerning for underlying organ damage because of the peritoneal irritation that may occur.)
- Any associated symptoms? (nausea, vomiting, altered sensorium)

PHYSICAL EXAMINATION

- Unfortunately, the initial presentation of a patient with severe liver injury can range from a conscious patient with subtle complaints and normal vital signs to one that is obtunded and in a state of severe shock.
- The most common findings are abdominal tenderness coupled with peritoneal signs, but these findings are not sensitive or specific for liver injury.
- The accuracy of the physical examination has been reported to be as low as 55% to 65% in identifying abdominal trauma.[18]