Liver Laceration Sustained by a College Football Player

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SPORT-RELATED abdominal injuries are typically associated with contact sports, such as football, rugby, and soccer. Abdominal trauma can also occur in non-contact sports, where the injury can be caused by an indirect deceleration mechanism. Abrupt deceleration can cause complete disruption of deep organs yet may present few superficial signs. Direct trauma produces a more localized injury with the severity of the injury dependent on the amount of force sustained. The abdominal organs are protected from direct trauma by the lower ribs and muscles of the abdominal wall. The spleen, the liver, and the kidneys are the most commonly injured organs. This case report presents the details of a liver laceration sustained by a college football player and his subsequent return to participation.

Case Study

Late in the 4th quarter of a NCAA Division I football game, a linebacker was injured when he was struck in his right abdomen and chest by the helmet of a blocker. The on-field examination revealed dyspnea, tachycardia, and tenderness and rigidity of his abdomen on the right side. No deformity or discoloration was evident. He was assisted to the sideline and placed on an examination table. During the sideline evaluation, his breathing became more labored and he continued to exhibit a tachycardic heart rate. He was transported to the hospital where a diagnostic ultrasound procedure and a computerized tomography (CT) scan were performed to evaluate the possibility of pneumothorax, hemothorax, kidney contusion, or liver trauma.

The ultrasound evaluation was negative, but the CT scan revealed the presence of a 3.4 cm × 1.5 cm nonperforating tear of the liver (Figure 1). Laboratory tests failed to demonstrate any evidence of internal bleeding. The athlete was admitted to the hospital’s intensive care unit (ICU) so that he could be monitored closely for the possibility of internal bleeding throughout the night. The following day, the athlete was released from the ICU. Another abdominal CT scan was performed, which demonstrated that the liver laceration had not worsened. The athlete remained hospitalized for another night for observation and was subsequently discharged with instructions to follow up with his team physician. A recommendation was made to repeat the CT scan at 8 weeks.
postinjury. He was further instructed to remain at rest for one week and to refrain from lifting anything heavier than 10 pounds.

A follow-up CT scan at one month postinjury demonstrated significant improvement in the status of the liver laceration, which had shrunk to 2 cm × 5 mm (Figure 2). The athlete was allowed to begin light jogging and weightlifting at 6 weeks postinjury. He was allowed to begin light practice drills without contact. Foam rubber padding that was covered by rigid plastic was used to protect his abdomen.

This athlete was cleared to resume all football activities at 7 weeks postinjury, which included limited participation in a game. He played in a limited role at 9 weeks postinjury and returned as a starting player at 10 weeks postinjury.

**Discussion**

The liver is the largest solid organ, which is enclosed by the rib cage anteriorly and laterally. It is located in the upper right quadrant of the abdominal cavity beneath the diaphragm and on top of the stomach, right kidney, and small intestine. Shaped like a cone, the liver is a dark, reddish-brown color and weighs about three pounds. It is responsible for over 500 vital functions, including production of bile, production of proteins for blood plasma, production of cholesterol and special proteins that transport fats, conversion of excess glucose into glycogen, the regulation of amino acids in the blood level, processing of hemoglobin, conversion of ammonia to urea, regulation of blood clotting, and the clearance of drugs and poisonous substances from the blood. The liver also aids the body in resisting infections by producing immune factors and removing bacteria from the blood.

The spleen and the liver are the most common solid organs injured during participation in sport activities. Blunt trauma to the right side of the thorax, upper abdomen, lower chest, or back can injure the liver, resulting in lacerations, subcapsular or parenchymal hematomas, internal hemorrhage, juxtahepatic venous injuries, or peri-portal flow attenuation.

![Figure 1](image-url) CT Scan taken acutely showing 3.4 × 1.5 cm nonperforating liver laceration.