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Liver and kidney injury from abdominal trauma: Case report

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Abstract---Trauma is the leading cause of death under the age of forty. Of all traumatic deaths, abdominal trauma is responsible for 10%. The findings to look for abdominal trauma are the following: Hemoperitoneum, Contrast blush consistent with active extravasation, Laceration: Linear shaped hypodense areas, Hematomas: oval or round shaped areas, Contusions: vague ill-defined hypodense areas that are less well perfused, Pneumoperitoneum, Devascularization of organs or parts of organs, and Subscapular hematomas.

Keyword---Liver injury, Kidney Injury, Trauma, Emergency, Operation.

Introduction

Traumatic abdominal injuries are life-threatening emergencies frequently seen in the Emergency Department (ED). Liver injury is the most common cause of death in patients with abdominal trauma, and hemorrhage is the main cause of early liver injury-related death. CT is the key imaging modality for triaging surgical and non-surgical treatment in patients with abdominal trauma and plays an important role in increasing the frequency and success rate of non-surgical treatment. Because rapid and accurate diagnosis of injury in patients with trauma can improve the patients prognosis, radiologists should be familiar with the imaging findings, especially the CT findings, in patients with trauma.

Case Presentation

We report 2 cases of abdominal trauma with ruptured liver and ruptured kidney, the first is a case of a motorcycle accident with a side-kick mechanism. In a high-

speed motorcycle accident, a twenty-year-old male sustained a direct, blunt injury to his abdomen. He came with stable vital signs with GCS of 15. From physical examination, there are swelling and tenderness of the right abdomen. The patient underwent FAST ultrasound and abdominal MSCT then was only given conservative treatment and close monitoring.

Physical Diagnostic:

- GCS : 456
- TD : 116/63 mmHg
- N : 103 x/minute
- RR : 20x/minute
- T : 36,0 °c

Primary Survey

Airway :

clear, no additional breath sounds, stable C-spine,

Breathing :

RR = 23 x/minute, O2 SpO2 98% free air spontaneous breath

I: visible injury on the right hemithorax, symmetrical chest wall motion, no respiratory muscle retraction

P: crepitus (-), symmetrical breath movements,

P: second sonor lung fields,

A: vesicular in both lung fields, rhonchi (-) and wheezing (-)

Circulation: Blood pressure: 114/71 mmHg, Heart rate: 107x/minute, regular lifting strength, Warm Dry Red Akral, CRT <2",

Abdomen: I : flat, not distended, looks lumbar injury D, attached DK production 200 ml/3 hours, reddish yellow

A : peristaltic (+) Normal

P: Soepel, muscular defans (-), right hypochondriacal tenderness, sign of free fluid (+)

P: tympanic, liver deafness is there

Disability: Glasgow Coma Scale 456, pupil isocor 3mm/3mm, light reflex +/-

Exposure:

Excoriate right hemithorax

Right lumbar excoriatum

Multiple vulnus appertum genu right, right and left cruris

Clinical Assesment:

- Blunt Chest Trauma
- Blunt Abdominal Trauma
- Vulnus right appertum genu and right left cruris

Management:

- Inf NaCl 0,9% maintenance 1500 ml/24jam
- O2 simple mask 6 lpm
- Inj Asam tranexamat 1 gr IV
- Inj Metamizole 1 gr IV
- Inj Metoclopramide 10 mg IV

Clinical Photos



Imaging Finding

From cervical photo on August, 26, 2022



Figure 1. There's no fracture and also without any abnormalities

1186

From CXR on August, 26, 2022



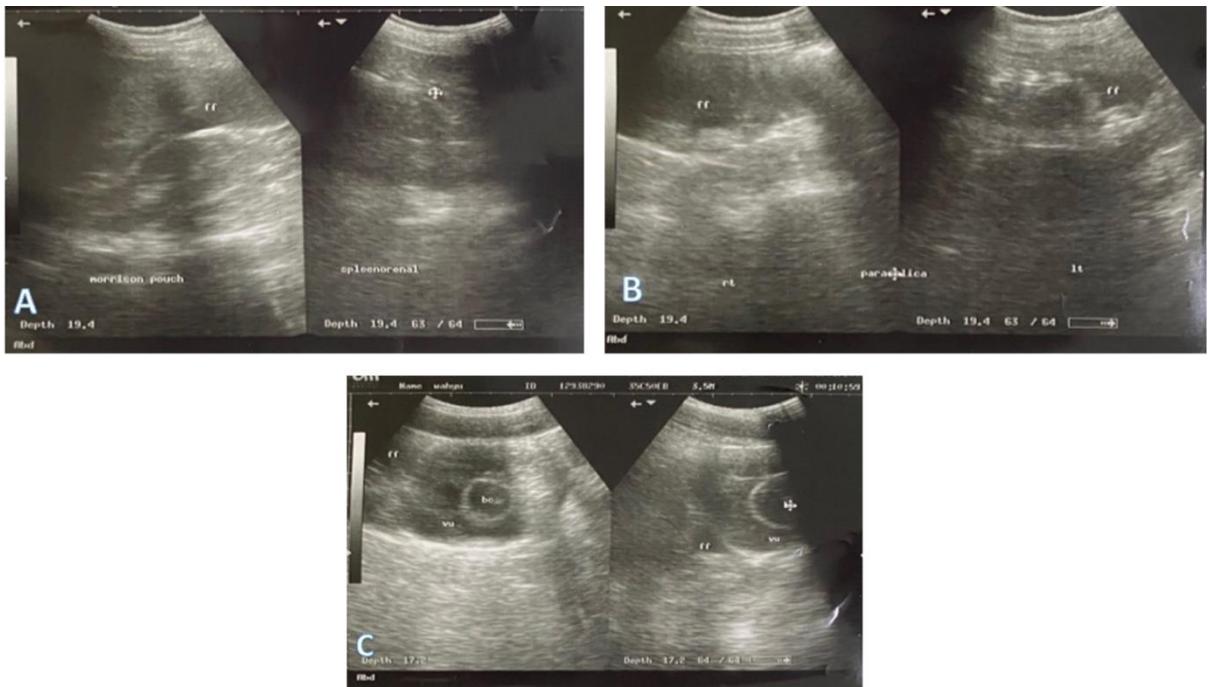
Figure 2. There's no fracture and without any abnormalities

From pelvic photos on August, 26, 2022

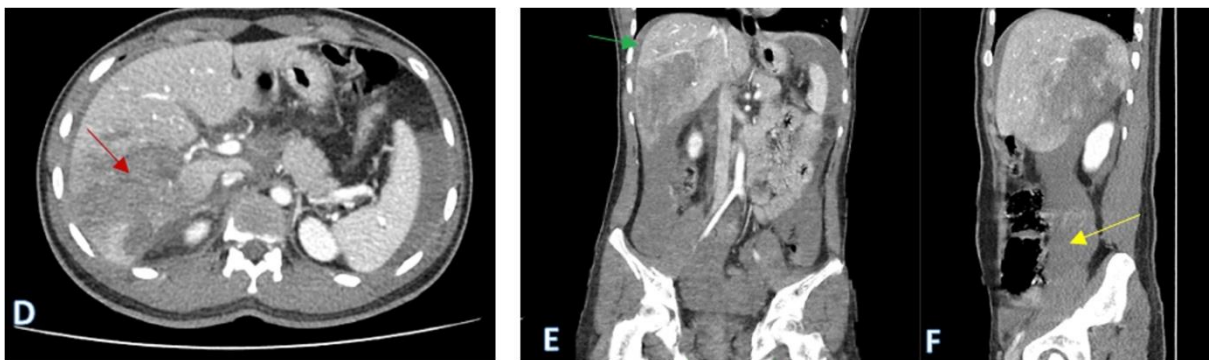


Figure 3. There's no fracture and without any abnormalities

From Focused Assessment Sonography For trauma (FAST) we found :



FAST demonstrate free fluid echo intensity in Morrison's pouch and splenorenal (A), paracolic gutter (B) and perivesica (C) and then we continue to the **Abdominal MSCT** and we found :



Axial MSCT demonstrate liver parenchyma disruption involving 25-75% with laceration depth +/- 7,7 cm (D, red arrow). Coronal plane of abdominal MSCT demonstrate subcapsular hepatic hematoma (E, green arrow). Sagittal plane of abdominal MSCT demonstrate with fluid density +41 HU (F, yellow arrow)

Second Cases

- reported male, 56 years old The patient was hit on his left flank by a car while he was sitting at the coffee shop.
- The patient was thrown +/- 3m to the right. The patient never lose consciousness after the accident. No history of vomiting and seizure
- The patient was transported to the Emergency Unit by PMI.

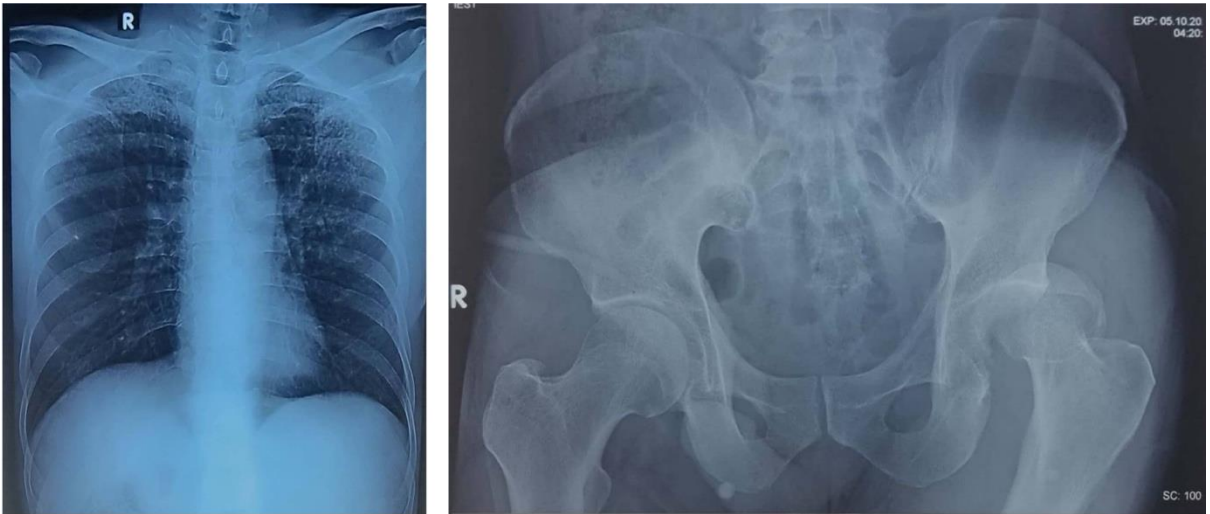
Physical Photos



Bloody Urine Bag

Imaging Finding

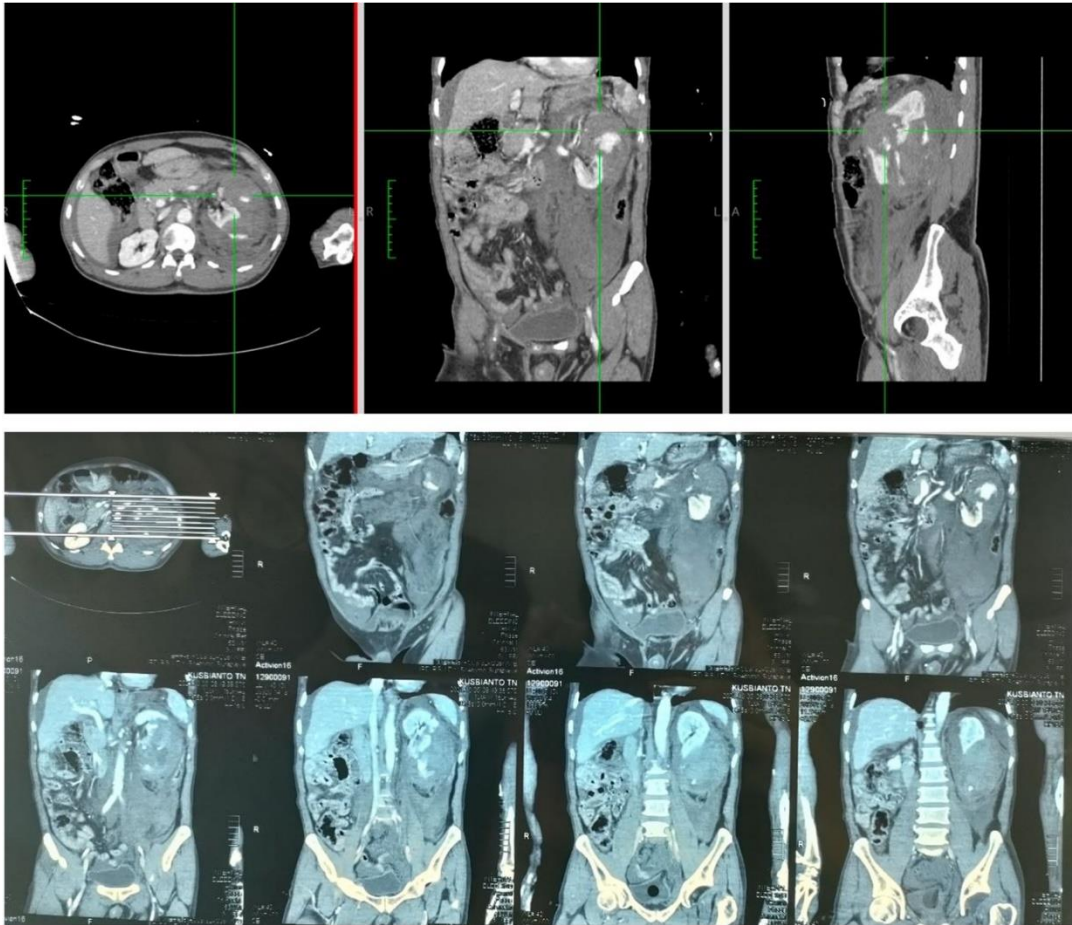
From CXR on Sept, 02, 2022 we found: there's no fracture and without any abnormalities



From pelvic photos on September, 02, 2022 we found **left femur dislocation**
from Focused Assessment Sonography for trauma (FAST) we found :



Found Positive, in paravesica, hypoechoic in left renal, uneven left renal contour



From MSCT Abdominal we found **Could be renal trauma (Severity Scale Grade IV according to AAST)**

Discussion

Plain radiographs

Plain x-ray plays a limited role in the evaluation of blunt abdominal trauma. Abdominal radiographs are usually unnecessary. X-rays of the chest and pelvis are often obtained to evaluate for concurrent thoracic or pelvic injuries. Abnormal chest x-ray findings of pneumothorax and rib fractures are associated with intraabdominal injuries and are indications for abdominal imaging if a mechanism for multisystem trauma is present. Common findings include free abdominal air (pneumoperitoneum), pneumothorax, and hemothorax. In the case of gunshot wounds, x-rays identify the location and number of retained projectiles.

Ultrasound

Ultrasound has become a common part of the initial assessment of blunt abdominal trauma. Ultrasound serves a screening function because it assesses for the presence of free fluid in the abdomen or pericardium but does not explicitly identify the source. The focused assessment with sonography in trauma (FAST) examination has been a standard part of the diagnostic algorithm since the 1990s in most U.S. trauma centers. The FAST exam looks for intra peritoneal and intra pericardial anechoic material representing fluid—which in the setting of trauma is assumed to be blood.

Advantages of ultrasound include portability (allowing it to be used during resuscitation), lack of ionizing radiation exposure, repeatability (allowing evaluation of changes in patient condition), and rapidity of the exam. Disadvantages include significant operator dependence and low sensitivity according detection of solid organ injury. Ultrasound is considered most useful in detection of solid organ injuries with associated hemoperitoneum. It is considered insensitive for the detection of bowel or retroperitoneal injuries.

However, a recent study of Moriwaki and al [1] found ultrasound was 85% sensitive and 100% specific for detection of free air in a prospective study of 484 patients. Some small studies have also investigated the utility of ultrasound contrast agents to detect active bleeding [2]. Ultrasound is relatively sensitive for free abdominal fluid. In a study, continuous scanning of Morison's pouch during infusion of DPL fluid revealed a mean detection limit of 619 mL. Only 10% of ultrasonographers (attending physicians and residents in emergency medicine, radiology, and surgery) detected volumes less than 400 mL. The sensitivity at 1 L was 97% [3]. Ultrasound is not sufficiently sensitive to exclude intraabdominal injury, limiting its utility as a definitive test for abdominal trauma. It allows selection of patients for CT and follow up.

Computed tomography in trauma

For most stable trauma patients, CT has become the definitive imaging modality of choice when intraabdominal injury is suspected. CT is rapid and highly sensitive and specific for many important injury types. The information provided by CT allows prognosis of injury and selective nonoperative management in both blunt and penetrating trauma. CT is less sensitive for some important injuries, including bowel and diaphragmatic trauma, a limitation that must be recognized to prevent clinical errors following a negative CT. For the evaluation of blunt abdominal or flank trauma, intravenous (IV) contrast should be routinely used, but oral contrast should not. We use 150 mL of intravenous contrast, infused at 2-4 mL per second, with CT being performed after a 60 second delay. A prior acquisition without intravenous contrast is recommended. It assesses solid organ hematomas and sentinel hematoma. Arterial acquisition is performed when chest exploration is indicated. Delayed acquisition (2-3 minutes) is performed when renal lesions or active bleeding are diagnosed. A number of studies have evaluated the safety and sensitivity of the triple-contrast CT approach. A metaanalysis performed by Goodman and al. [4], performed to determine the predictive value of CT for laparotomy in hemodynamically stable patients with

penetrating abdominal trauma. They identified 180 studies but included only 5 because of methodologic concerns. The pooled sensitivity, specificity, negative predictive value, positive predictive value, and accuracy were 94.90%, 95.38%, 98.62%, 84.51%, and 94.70%, respectively.

Overall, triple-contrast CT appears to be a safe management strategy in highly selected stable patients without peritonitis on examination. Multiple studies have demonstrated the possibility of missed diaphragmatic injuries and, rarely, missed operative bowel injuries. Following a negative triple-contrast CT, observation or close follow-up should be ensured. Non-operative management (NOM) is the treatment of choice for all hemodynamically stable minor (AAST I-II), moderate (AAST III), and severe (AAST IV-V) injuries in the absence of other internal injuries that requiring surgery. In patients considered transient responders with moderate (AAST III) and severe (AAST IV-V) injuries, NOM should be considered only in selected settings that provide the immediate availability of trained surgeons, operating room, continuous monitoring ideally in an Intensive care unit or Emergency Room setting, access to angiography, angioembolization, blood, and blood products, and in locations where a system exists to quickly transfer such patients to higher level of care facilities. Patients with hemodynamically unstable should undergo operative management⁵. Because our patient is hemodynamically stable, the clinician decide to closely observe the patient without any surgical approach.

Conclusion

Management of liver and kidney trauma is multidisciplinary. When feasible, non-operative management should always be considered as the first option in adult and in the pediatric populations. CT scan is the modality of choice for the evaluation of blunt hepatic trauma in hemodynamically stable patients. Clinical condition, anatomical injury grade and associated injuries should be considered together in deciding the best treatment option.

Conflict Of Interest

The authors declare no conflict of interest

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