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Delayed Post-Traumatic Splenic Rupture After Fall in a Hemodynamically Stable Patient with Undiagnosed Pancreatic Malignancy Which Occluded Both Splenic Artery and Vein

Zacharis N[1], Konstantatou E[2], Potsios C[3], Xaplanteri P[4*] and Zacharis G[5]

[1]GP, Internal Medicine, Patras, Greece

[2]Radiologist in Private Practice, B-Diagnosis, Patras, Greece

[3]Department of Internal Medicine, University General Hospital of Patras,

[4]Department of Microbiology, General Hospital of Eastern Achaia, Kalavrita, Greece

[5]Department of Surgery, General Hospital of Patras, Patras, Greece

[*]Corresponding author:

Panagiota Xaplanteri,
Head of Microbiology Department, General Hospital of Eastern Achaia, Greece,
Tel: 0030-2692-360130, Fax: 0030-2610-992618,
E-mail: panagiota.xaplanteri@gmail.com

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1. Abstract

The spleen, due to its anatomical position, is the most frequently injured organ of the abdomen due to blunt trauma. Herein we describe the case of a 59-year-old female patient who fell from the same height and five days later she complained of persistent pain in the left hypochondrium. Point of Care Abdomen Ultrasound (POCUS) revealed a hypoechoic formation in the splenic parenchyma. She proved to suffer from an extended pancreatic neoplasm of the body and tail which infiltrated and occluded both the splenic artery and vein, met the common hepatic artery and was also in direct contact with the stomach. The spleen capsule had features consistent with post-traumatic rupture. Although the patient had such an extended abdominal malignant mass, had no related symptoms prior to the fall. The mechanism of spleen rupture seemed to be trauma of splenic parenchyma on the ground of preexisting liquified infarct, which led to delayed capsular rupture five days after the fall. What is interesting about this case is that that the patient was hemodynamically stable at the time she reached for medical assistance, probably due to the occluded splenic artery and vein. High clinical suspicion and the use of POCUS saved time and proved to be a valuable diagnostic tool.

2. Introduction

The spleen is a visceral, highly vascularized, encapsulated hematopoietic organ of the left upper abdominal quadrant. Due to its anatomical position, splenic rupture is frequent after blunt abdominal trauma [1].

In descending order of frequency, traumatic splenic rupture occurs due to motor vehicle injury and direct abdominal blows of the left flank [1, 2]. In patients with splenomegaly, less force is required for traumatic rupture, even in the absence of substantial trauma [1].

Unrecognized splenic injury can be a cause of preventable traumatic death [2]. Therefore, ultrasound at the bedside (Point of care abdomen ultrasound, POCUS) in the emergency department or Primary Care is extremely useful as it has been described to detect as little as 100 mL of free fluid in the abdomen with 90% sensitivity [1].

If the patient is stable, abdomen Computed Tomography (CT) is the choice of evaluation as it provides information about the extent and severity of injury not only of the spleen, but also of other adjacent abdominal organs. An intraparenchymal or subcapsular hematoma associated with delayed splenic rupture is also easier to identify [1].

Herein we describe the case of a 59-year-old female patient who fell from the same height and five days later she complained about persistent pain in the left hypochondrium. POCUS showed a hypoechoic formation in the splenic parenchyma. Abdomen CT scan revealed an extended pancreatic neoplasm of the body and tail which infiltrated and occluded both the splenic artery and vein, met the common hepatic artery and was also in direct contact with the stomach. Trauma of the splenic parenchyma was detected on the ground of preexisting liquefied infarct. The spleen capsule had features consistent with post-traumatic rupture.

3. Presentation of Case

A 59-year-old female patient, with free history, sought medical assistance from Primary Care physician due to persistent pain in the left hypochondrium after falling from the same height five days previously. Physical examination revealed that the patient was in good general condition, afebrile, blood pressure of 120/70 mmHg, pulse rate of 70 beats/min, and oxygen saturation of 99 % (FiO2: 21 %). Abdomen auscultation revealed normal sounds. On abdominal palpation the patient felt upper quadrant pain. POCUS revealed a hypoechoic formation in the spleen. In the light of these findings, the patient was transported to the General hospital of the region, where a CT scan of the abdomen was performed. CT revealed pancreatic neoplasm of the body and tail which occupied an area of 31 × 58 mm. Extra-pancreatic extension of neoplastic tissue up to 14 × 27 mm infiltrated and occluded both the splenic artery and vein, resulting in the presence of liquefied infarct 4 × 5 cm at the lower pole of the spleen. The presence of swelling of the peripancreatic fat in combination with liquid elements was compatible with post-traumatic rupture of the capsule. Another infarct was detected in the upper pole about 20 mm in size. The additional extra-pancreatic tissue met the common hepatic artery and was also in direct contact with the stomach. The hypoechoic formation in the splenic parenchyma described by the POCUS was displayed in CT as trauma on the ground of preexisting liquefied infarct. A 4 mm cyst coexisted in the neck of the pancreas. Splenomegaly (15 cm) was also detected. As soon as diagnosis was established, according to the patient's wish, she was transferred to her place of residence for treatment.

4. Discussion

Spleen, due to its anatomical position, is the most frequently injured organ of the abdomen due to blunt trauma. A normally sized spleen lies in the left hypochondrium totally protected by the 9th and 11th ribs. Spleen is the most vascular organ in the body. Splenic artery is the largest branch of truncus coeliacus. The soft consistence and the fibroelastic capsule render the spleen fragile when exposed to augmented intra-abdominal pressure as it occurs during a blunt trauma [2, 3].

In the context of blunt trauma there are two mechanisms of spleen rupture. The first is transcapsular spleen rupture, where capsule and parenchyma rupture takes place simultaneously and leads to profound blood loss and death. The second mechanism is subcapsular rupture. A subcapsular hematoma occurs, which enlarges for hours or days. As it augments in size, it exerts pressure to the capsule which eventually breaks [3]. Our patient suffered from an enlarged spleen due to malignant tissue involvement. The organ, because of occlusion of both splenic artery and vein, displayed liquefied infarcts. The trauma provoked by the patient's fall, on the ground of these liquefied infarcts, caused a hypoechoic formation in the splenic parenchyma detected via the POCUS. Abdomen CT scan revealed the size of damage in the area and gave detailed information about the spleen and pancreas.

Solid pancreatic tumors, like carcinoma, in an early stage usually appear with nonspecific symptoms from gastrointestinal tract like dyspepsia, early satiety, and nausea. Late symptoms include: epigastric pain, vomiting, diarrhea, weight loss and obstructive jaundice [4]. Our patient described none of the above symptoms and the tumor was discovered via the CT as a random finding.

Splenic metastases are usually asymptomatic. Symptoms from the left upper quadrant, if any, are due to compression of surrounding organs [4]. Pancreatic carcinoma invades the spleen via direct spread and invasion [4]. Our patient had an enormous malignant tissue rushed by the pancreas and spreading to the adjacent spleen and stomach.

Splenic infarcts can occur due to arterial obstruction or venous drainage. Almost half of the patients are asymptomatic. Most common symptoms are diffuse abdominal pain or localized left upper quadrant pain that may reflect to the left shoulder due to irritation of the left hemidiaphragm [5]. Hematologic disorders and hypercoagulable states are the most common causes of splenic infarcts. Other causes are embolic events due to infective endocarditis, splenic vascular disease, splenic arterial aneurysms, pancreatitis, non-hematologic malignancies, blunt trauma, splenic artery compression by pancreatic tumor, and leukemia [5]. Our patient had splenic infarcts due to the occlusion of splenic artery and vein by the pancreatic malignant tissue.

In the acute phase it is difficult to diagnose a splenic infarct via ultrasound as it can be isoechoic to the splenic parenchyma. As it matures, it appears as a hyperechoic region with retraction of the capsule or as a liquefied area rounded and anechoic (splenic pseudocyst) [5]. CT with contrast is the imaging investigation of choice for both hyperacute phase and established infarct [5]. A typical infract of the spleen has the shape of a pyramid with the base towards the splenic capsule. Maturation of the infarct leads to resolution, scarring, or liquefaction [5]. POCUS is a valuable adjunct to physical examination, performed at the bedside in primary care setting [6]. It is targeted ultrasound examination that helps with velocity and accuracy to answer clinical questions, and to enhance decision-making, especially concerning the acute abdomen pain

[6, 7]. Our patients' infarct was liquefied and thus detectable via abdomen CT and was depicted as a hypoechoic region via POCUS.

Delayed splenic capsular rupture is also a relatively rare entity. It is defined as bleeding more than 48 hours after blunt abdominal trauma. Its mortality rate is 5-15%, whereas mortality related to acute splenic rupture is 1%. The patient is hemodynamically instable [7-9].

In our patient, the splenic trauma caused by the fall, led to capsular rupture five days later. What is interesting about this case is that the patient was hemodynamically stable at the time she reached for medical assistance, probably due to the occluded splenic artery and vein by the pancreatic malignancy. Her only symptom was persistent pain in the left hypochondrium manifested five days after the fall. Strong clinical suspicion and the use of POCUS lead to more timely diagnosis. In our case POCUS proved to be a valuable diagnostic tool.

5. Conclusion

High clinical suspicion of delayed splenic rupture should always be in mind after blunt abdominal trauma and left hypochondrium pain, even if the patient appears hemodynamically stable. The use of POCUS in Primary Care setting or the Emergency Department is a valuable diagnostic tool in this direction.

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