

Review Article

Spontaneous grade iv splenic laceration; excellent results of conservative treatment by minimal invasive approach: a case report

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Abstract

Introduction: Splenic injury; which can occur due to rupture or laceration, is a life threatening clinical manifestation. It is mostly seen secondary to thoracic or abdominal trauma, and occurs very rarely depending on other known causes and less happens due to unknown etiologies, named 'spontaneously'. Here, we reported a patient with splenic injury, who can be seemed fortuitous event, because of excellent results with conservative treatment. We also reviewed and analyzed current literature to provide information for clinicians about the management of spontaneous splenic laceration cases with conservative approach.

Presentation of Case: A sixty-four years-old male patient is admitted to the emergency surgery with abdominal pain. After physical examination and laboratory tests, he was screened by abdominal CT-Angiography. CT scan demonstrated Grade IV Splenic laceration. Instead of surgical therapy, he was followed-up conservatively and had been managed by minimal invasive procedures during the hospitalization period.

Discussion: It is crucial to carefully monitor patients receiving non-operative management in such cases. Non-operative management can be favorable as it preserves splenic function and prevents laparotomy-associated complications. In our case, we preferred the non-operative approach using the minimal invasive procedures incorporation with interventional radiology department.

Conclusion: As in our case, splenic artery embolization which is a minimally invasive method, should be preferred instead of surgical interventions in spleen lacerations.

Key words: Spontaneous splenic laceration; conservative management; angiography

Introduction

Splenic injury which can occur due to rupture or laceration, is a life threatening clinical manifestation. Mostly seen secondary to thoracic or abdominal trauma, rarely some of them are because of other known causes and some others happen due to unknown etiologies, so named 'spontaneously' [1-4].

The common approach for splenic injuries was to perform splenectomy for controlling bleeding. Independently from the degree of rupture or laceration, it was the mostly preferred method for surgeons. Both, establishment of grading system for

injuries (grade 1 to 5, depending on the percentage of injury) and determination of non-operative approaching criteria's lead the way to conservative management in our daily clinic. Looking retrospectively, it was understood that numerous unnecessary splenectomies had been performed for most of the patients, even for the cases who had grade 4-5 splenic injuries. Morbidity and mortality rates seemed even less when compared to the previous records [5- 6].

In this paper, we reported a patient with splenic injury, who can be deemed very lucky, because of excellent results of conservative treatment and minimal invasive interventional radiological procedures. We also provided a current literature review about conservative management of spontaneous splenic laceration cases.

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Presentation of Case

A sixty-four years old man was admitted to Istanbul University Istanbul Medical Faculty Emergency Service with a left upper quadrant pain radiating to left shoulder that started 6 hours ago. He had no trauma history. His medical background revealed grade II chronic obstructive pulmonary disease (COPD) for nine years and he was under follow-up in 'Department of chest disease'. He gave up smoking and had no complaint of cough.

On the first day of admission; his hemodynamic parameters was monitored stable. On physical examination, palpation of left upper quadrant was painful. No pathologic images were detected on standing plain abdominal graphy and PA-thorax graphy. Complete blood count, biochemistry (Glucose, blood urea nitrogen, creatinine, electrolytes), c-reactive protein (CRP) and complete analysis were done. White blood cell (WBC): 24.700 / uL, Hgb:8/dL, Htc:24/dL, INR: 0.9, aPTT: 28.5 s, PT:11 s were recorded as on his admission. Computed tomography was taken because of the severe abdominal pain complaint of patient to make differential diagnosis.

Radiologists interpreted: "Compatible with grade IV splenic laceration and also a suspicious image of contrast extravasation from collateral branches of proximal splenic artery. There is minimal fluid collections around the spleen and in the lower quadrants of the abdomen" (Figure 1 a-b-c) on contrast enhanced

thoracoabdominal tomography, Then, the patient was hospitalized to make further investigations and treatment of 'Spontaneous Grade IV Splenic laceration'. Patient was started to follow up closely monitored for the hemodynamic parameters, in the emergency room. Urinary Foley catheter was applied. A multilumen catheter was inserted through external jugular vein by an anesthesiologist to measure central venous pressure. Oral intake was stopped, and parenteral treatment was ordered. As the control Hgb and Htc values were 7.2/dL and 21.2/dL, consecutively one hour later; one unit erythrocyte suspension (ES) and one unit fresh frozen plasma (FFP) were transfused immediately. First 24 hours, 4 times a day CBC (Complete blood count) follow-up was added.

CT-angiography was taken them in order to show contrast extravasation accurately and to determine the decision of treatment strategy. CT angiography revealed that "There seemed a suspicious image of contrast extravasation from collateral branches of proximal splenic artery". After the evaluation in conjunction with radiologists, it was decided to perform angiography and if possible to make embolization to the patient. In angiography, 5F catheter was inserted into the right femoral artery, and collateral branches of proximal splenic artery was embolized with three pieces of 2 mm * 2 mm coil under the fluoroscopy, at the interventional radiology department (Figure 2 a-b) Any complication was seen during his follow-up after the procedure and then he was sent back to the service.



Figure 1: a-b-c: Perisplenic and perihepatic collections which seem compatible with grade IV splenic laceration (blue arrows)

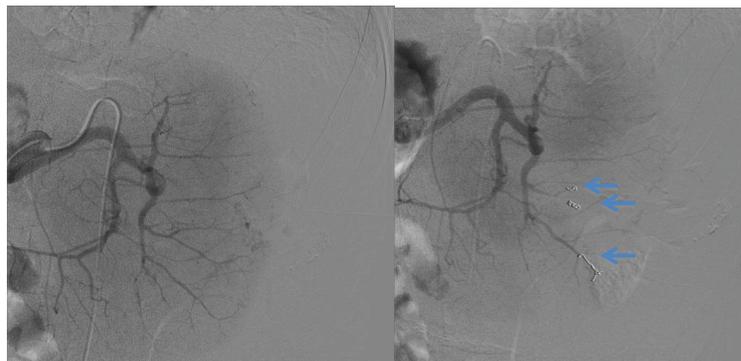


Figure 2-a: There seemed a suspicious image of contrast extravasation from collateral branches of proximal splenic artery **Figure 2-b:** Distal colleteral braches of proximal splenic artery were successfully embolized

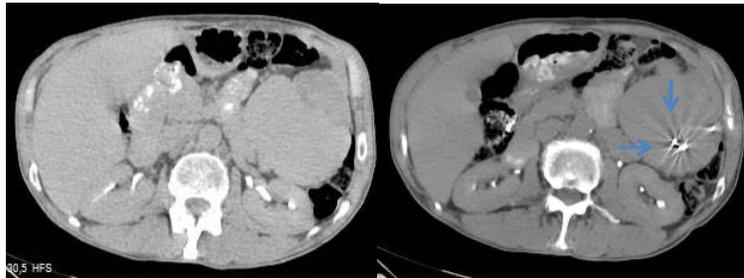


Figure 3a-b: There seemed 3*3 cm of an encapsulated resorbed hematoma collection above the spleen. It was significantly regressed when compared to the previous CT.

A total of 5 Units ES and 3 Units FFP were transfused in two days. In the follow-up after embolization; Hb: 9.7/dL, Htc: 30/dL was detected. On the first day after the operation, the close monitoring of the patient in emergency observation room showed cardiac pulse rates between 78 and 113, and the average tension rates around 120/80. So that close monitoring was terminated and he was taken to his room in clinic.

The following day after the embolization procedure, the radiologists evaluated him with ultrasonography. One 14 F percutaneous drainage catheter was intended for the hematoma collection seen around the spleen that was visualized under abdominal ultrasonography to prevent further abdominal distention, and for the possibility of the collection to become infected. A total of 4200 cc drainage was collected within seven days. The content of the incoming fluid was consistent with the hematoma. In this process patient's vital signs were stable and Hgb / Htc values did not decrease. This shows that there is no active bleeding and the hematogenous fluid from drains was due to resolution of hematoma and reactionary peritoneal fluid that occurs due to irritation of peritone.

Full oral intake was started on the fourth day of his hospitalization period. During his follow-up, he was consulted by the chest diseases, internal medicine hematology department and infectious diseases to find-out the etiology of the laceration. Serologic tests were also studied for our case, and the results were negative. There was no evidence to show that COPD was exacerbated in the patient evaluated by the chest diseases. Hematologic disease was not detected in the evaluation by the hematology. Control CT angiography was obtained one week after the patient's procedure. The CT revealed that the pre-splenic fluid retreated, and a hematoma area localized 3 * 3 cm encapsulated around the spleen. (**Figure 3a-b**). It was significantly regressed when compared to the previous CT. His blood test results were normal and had no significant clinical complaint. The patient was discharged on the 8th day of his admission.

Discussion

Spontaneous splenic rupture and laceration were first defined by Rokitansky and Atkinson consecutively in 1861 and 1874 after reported cases. Splenic injuries are mostly seen due to trauma,

and these are generally blunt and penetrating injuries. However; atraumatic, spontaneous splenic injuries are clinic entity which seem rarely with a percentage of (0.1%-0.5%), and they can be misdiagnosed with other acute abdominal etiologies. Common known etiologies for spontaneous splenic injuries are; infectious diseases (Ebstein-Barr Virus, Plasmodium and CMV), congestion of splenic vein and portal vein, torture of spleen around its body, rupture of degenerative splenic artery aneurysm, increased abdominal pressure and forgotten history of abdominal trauma. The diagnosis of splenic injury is mostly made by radiologically after a detailed physical examination. Abdominal angiography is the gold standard method for the screening of injury [7].

Also in our case, the patient presented with a left upper quadrant pain which started suddenly. In view of possible causes pneumonia, splenic infarction, pyelonephritis etc. CT was used for differential diagnosis. A detailed anamnesis was obtained in order to identify the etiology of the patient after detection of splenic lesions on CT. The patient stated that there was no trauma history, and also no violent coughing recently. Besides that we also studied serologic tests for our case, and the results were negative. It helped us to eliminate infectious diseases mostly, from the etiology. CT angiography is the most effective method for contrast extravasation in spleen laceration, so that our patient was visualized by contrast enhanced abdominal angiography, and intermittent screening was done on the follow-up.

Spleen is the most vulnerable solid organ to injury in the abdomen. Rupture or laceration of spleen may require urgent operative management (splenectomy), angioembolization or non-operative management depending on the observation. Non-operative management and minimal invasive approaches started to take a bigger part in this era. Low-grade injuries (I, II, III) and sometimes even high-grade (IV and V) injuries had been managed conservatively [8].

Besides that, splenectomy has its own complications on the short and long term. Patients become susceptible to infections; mostly by encapsulated organisms (pneumococcus, meningococcus, H.Influenza B). They have an increased risk of septicemia on the post-operative period [9]. Due to thrombocytosis, splenectomized patients have an increased risk of deep vein thrombosis and

pulmonary embolism. Another important complication is malignancy. The risk of most malignancies (solid tumors such as buccal, esophageal, liver, and hematological malignancies) tends to be highest during the first 2-5 years following splenectomies [10].

Our patient had a known COPD, and splenectomy of COPD patient is also likely to increase the risk for pulmonary infections. At the same time, an invasive surgical procedure itself would increase possible lung pathologies, especially atelectasis in the post-op period.

After splenectomy, there is also risk of intraperitoneal hemorrhage on the post-operative early period. It is associated with a high percentage of hospital mortality rates with delayed or inadequate treatment. In the literature, it is stated that it may require subsequent reoperation or could be drained by percutaneous catheter under USG or CT guidance [11-12].

On the other hand, development of transcatheter and angiography techniques gives to interventional radiology an important role in the management of patients with contrast extravasation from artery. Hemodynamically stable patients with splenic injury can be managed non-operatively with TAE (Transarterial Embolization) [13-15]. Common indications for splenic artery embolization are the presence of a contrast blush or pseudoaneurysm on CT of the abdomen, American Association for the Surgery of Trauma (AAST) grade IV-V injuries, or continuous drop in hemoglobin level in the course of attempting nonoperative management. Our patient was hemodynamically stable and embolization decision was taken because of contrast extravasation from splenic artery branch. Embolization treatment was extremely effective in terms of splenic salvage (92% salvage rate). Basically, there are two types of TAE available for spleen; proximal and distal embolization. Proximal TAE is performed by deploying coils 2 cm beyond the origin of the dorsal pancreatic artery but proximal to the first pancreatic magna artery. Distal TAE is typically performed using gelfoam pledgets or slurry distributed by flow. Embolization materials were positioned in the segmental branches of the splenic artery, within the parenchyma. Embolization treatment was extremely effective in terms of splenic salvage [16].

We preferred the non-operative and minimal invasive approach for our case. At our institution, arterial access was obtained through the common femoral artery with placement of a vascular sheath. Celiac arteriography was performed to delineate the arterial anatomy and then selective catheterization with subsequent performance of arteriography of the splenic artery was carried out. If images demonstrated active contrast extravasation, the injured vessels were selectively catheterized and embolized using fibred coils. No problem was recorded during and after the procedure. After that, percutaneous drainage was applied under USG intended for the free hematoma collection around the spleen.

It is crucial to carefully monitor patients receiving non-operative management. Non-operative management can be advantageous as

it preserves splenic function and prevents laparotomy-associated complications.

As splenic artery embolization is a minimally invasive procedure, it should be kept in mind that complications related to the procedure may occur. These complications can be evaluated as major and minor complications. Major complications include extensive splenic infarction and splenic abscess. Minor complications include migration of embolization material, pseudocyst formation, vascular thrombosis, pancreatitis, renal impairment, and pleural effusions [17-18]. For our case; no complication was observed.

Conclusion

Surgical therapy or splenectomy (partial or total) should be reserved for patients with signs of ongoing bleeding or with hemodynamic instability. Today in the management of splenic injuries favors the non-operative or conservative approaches. New and larger studies with bigger patient populations are needed in order to assess usefulness of conservative approach in grade IV and V injuries and cost affectivity of non-operative management in all grades of splenic injury. In conclusion as it is in our case, embolization of the splenic artery branch in spleen laceration can be preferred to surgical intervention as a minimally invasive method.

Declaration of Conflicting Interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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