Disseminated Intravascular Coagulopathy After Splenic Artery Embolization: A New Complication

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Introduction

Splenic artery embolization (SAE) is a common procedure with a variety of indications including treatment of splenic laceration, reduction of blood loss during splenectomy, hypersplenism causing thrombocytopenia, senestral portal hypertension, post-transplant portal hyperperfusion syndrome, and splenic artery aneurysms. SAE is associated with a variety of reported adverse events with the most common being post-embolization syndrome, ascites, pleural effusion, splenic abscess, and need for re-intervention. Here we report a new adverse event in the form of disseminated intravascular coagulopathy post SAE.

Case Presentation

82-year-old female patient with myelodysplastic syndrome (MDS) and splenomegaly, measuring up to 30 cm, presented for surgical consultation due to chronic abdominal discomfort and tenderness to palpation over her left hemiabdomen. Splenectomy was offered for palliation. Due to the marked splenomegaly, there was concern for increased risk of bleeding during splenectomy and pre-operative SAE was planned for the day prior to surgery. At the time of embolization the patient was hemodynamically stable and labs were significant for WBC 7.9 K/uL, Hgb 9.2 g/dL, and Plt of 115 K/uL.

Intervention

Proximal SAE was performed via right femoral artery access utilizing a 12mm Amplatzer plug. Post embolization digital subtraction angiography showed occlusion of the proximal splenic artery with filling of the distal splenic artery and spleen via collaterals. The arteriotomy was closed with a closure device and the patient was admitted to the hospital in preparation for planned splenectomy the next day. The patient experienced mildly increased abdominal pain after embolization and later that evening became febrile. Laboratory values demonstrated elevated WBC counts with progressively decreasing hemoglobin and platelets. PT, PTT, and D-dimer were increased and fibrinogen was decreased which are all suggestive of disseminated intravascular coagulopathy. The patient was transferred to the ICU and thromboelastography was used to guide transfusion of 3 units pRBC, 1 unit cryoprecipitate, 1 units platelets, and 5 units of fresh frozen plasma. The patient underwent planned splenectomy on post-operative day 1 from splenic artery embolization. Hgb remained stable after transfusion and surgery, and platelets trended up over several days. The coagulopathy resolved within 48 hours of SAE and within 24 hours of splenectomy.

References

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Figures

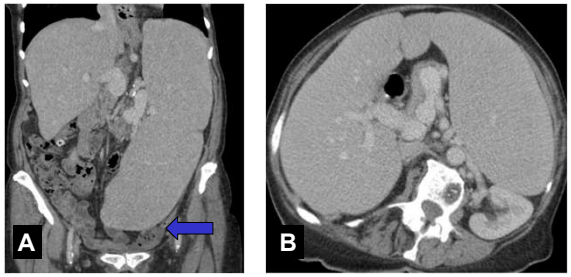

Figure 1: Coronal (A) and Axial (B) CT abdomen and pelvis prior to surgical consult at Henry Ford Hospital. Note the extension of the spleen into the pelvis best seen on the coronal (blue arrow).

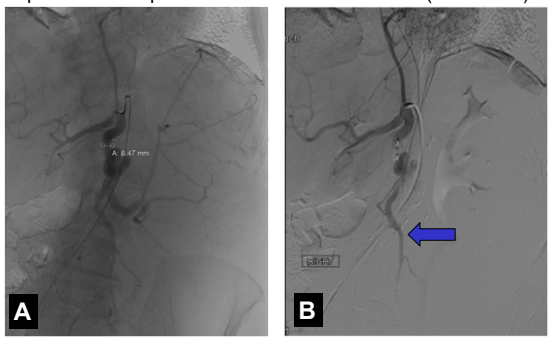

Figure 2: Digital subtraction angiography of the splenic artery before (A) and after embolization (B) with an Amplatzer plug. Note distal filling of the splenic artery via collaterals (blue arrow).

Date	Lab Values						Transfusions			
	INR	PTT	D-dimer	Fibrinogen	RBC	Plt	Cryo	RBC	FFP	Plt
Pre	1.2	39			9.2	115				
1200	Embolization						Embolization			
1500	2.3	79			8.9	55				
1848	2.8	67								
2318	2.4	57	>20	165	7.6	40	1	1	1	1
0900	Surgery						Surgery			
1358	1.4	40	7.1		6.5	66		2	2	
2000	2.3	46							1	
2155	1.2	33		429	7.2	60			1	

Table 1: Coagulation lab values (left) and blood product transfusion timeline (right). Note elevated INR, PTT, and D-dimer, with decreased fibrinogen, Hgb, and platelets within 12 hours of the SAE. After the initial 1:1:1:1 transfusion further transfusion of blood products was based on thomboelastography (TEG) values (not shown).

Discussion

Adverse events are common after SAE making the ability to recognize and treat them important for endovascular practitioners. These will be discussed below in order of frequency:

- Post-embolization syndrome causing left upper quadrant/flank pain +/- fever, nausea, and imaging findings of splenic infarct. If the upper pole of the spleen is selectively embolized there is increased risk of atelectasis/pneumonia. Post-embolization syndrome occurs in 70-80% of distal SAEs and is treated with a combination of anti-inflammatories and analgesia (1).
- Pleural effusion or ascites, which combined occur in 17% of cases. Management is symptomatic support and can include diuresis as well as paracentesis/thoracentesis as needed (1).
- After partial splenic artery embolization, portal system venous thrombosis has been reported in 15% of cases in one small series (2)
- In cases of splenic artery embolization for aneurysms and traumatic hemorrhage, recurrent bleeding requiring re-intervention occurs 7% of the time with treatment including repeat endovascular intervention if feasible or surgery (1).
- After SAE for trauma, deep venous thrombosis (DVT) occurred in 4.5% of patient in one retrospective review (3)
- In distal SAE, 1-2% of cases splenic abscess or bacterial peritonitis will develop as evidenced by fever, leukocytosis, complex fluid collection on imaging, +/- sepsis. These require antibiotics and occasionally percutaneous drainage.
- Other adverse events relate to general endovascular access and include access site pseudoaneurysm, distal embolism, and dissection.

The exact etiology of the venous thrombosis related complications is not fully understood, but other authors have speculated that it may pertain to the thrombocytosis seen after SAE (3, 4).

No prior reports of consumptive coagulopathy after SAE have been reported in the literature. We speculate that in our case this may have related to the patient's massive splenomegaly and history of MDS. Given the marked size of the spleen, even with a proximal embolization, the collateral flow may have been tenuous and ultimately insufficient to prevent acute infarct. However, this remains pure speculation until further cases are reported.

In the case reported here, management of coagulopathy with thromboelastography (TEG) based transfusions was critical in effectively treating the DIC and minimizing blood product usage. This method seemed effective in this case with coagulopathy resolving within 48 hours.

Conclusion

- Splenic artery embolization is a relatively common procedure with minor adverse events being common.
- We present a case of a possible new adverse event in the form of DIC after SAE.
- Post-embolic coagulopathy was successfully managed with TEG based transfusion.