

Splenic Artery Embolization (SAE), in a Patient with Consumptive Coagulopathy due to Massive Colonic Bleeding, and Massive Blood Transfusion, as a Bridging Therapy before Colonic Surgery

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Abstract Assessment of patient's health status and hematological parameters usually precedes any invasive diagnostic or therapeutic procedures; Angiography can be effective and safe as an alternative for major surgical procedures, or as a bridging management in such cases. We present a critically ill patient with colon cancer, with massive bleeding and consumptive thrombocytopenia that underwent splenic artery embolization as a bridging therapy before definite therapeutic surgery.

Keywords: *splenic artery embolization, thrombocytopenia, consumptive coagulopathy*

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1. Introduction

While partial splenic artery embolization has shown promise in the treatment of a wide spectrum of disorders, the incidence of serious complications with this technique has limited its use as an alternative to operative splenectomy. It is effective in controlling bleeding posttraumatic spleen injury, increasing platelet count in patient with low platelets due to liver cirrhosis or immune thrombocytopenic purpura, and patients with pancytopenia due to hypersplenism.

We report a case of a 64-year-old female patient who was diagnosed as ascending colonic adenocarcinoma and needed surgical intervention, but was not fit for surgery due to consumptive coagulopathy after bleeding and massive transfusion, and failure to treat her thrombocytopenia preoperatively as per guidelines, therefore, we decided to do SAE.

2. The Case

A 65 year old female patient, with free past medical and surgical history, was in her usual state of health till few months prior to admission, as she was complaining of recurrent abdominal pain, nausea and vomiting, she sought medical advice in July 2017, and was diagnosed to have colon cancer, abdominal CT scan showed marked luminal narrowing and wall thickening in the cecum and ascending colon, therefore colonoscopy was done and a fungating ulcerating tumor in cecum and ascending colon

was found so biopsy was taken for histopathology which showed infiltrating moderately differentiated adenocarcinoma.

Ten days prior to admission patient developed fresh bleeding per rectum, so presented to ER and was given 6 units packed RBCs, 12 units fresh frozen plasma, and 20 units of platelets, then referred to our hospital for surgical hemi-colectomy at that time she had severe ecchymosis all over.

At our hospital, full lab tests were done pre-operatively as shown in [Table 1](#). But as the patient had isolated thrombocytopenia, with bleeding time measured around 17 minutes, daily measurement of platelets was done; [Table 2](#).

After consultation of the hematologist, full lab tests with blood film were done ([Table 1](#)) and failure of conservative treatment to elevate her platelet count, (for which she received a total of 16 units of platelets, 2 units of PRBC and pulse steroids therapy. The patient was then referred to the interventional radiology department for partial splenic artery embolization after 10 days in the ICU.

The patient's hemodynamic parameters were normal just before catheterization. Selective splenic artery cannulation was performed, after mapping the splenic artery branches; partial embolization of middle and lower branches using micro particles was done.

Table 1. Lab results

| | | |
|-----------------------------|------------------------|------------------|
| HGB: 9.3 | PLATELETS: 6000 | WBC : 8.2 |
| PT : 14 sec | INR : 1.29 | PTT 39sec |
| D-Dimer : 1200 | Fibrinogen : 1026 | Albumin: 3.6 |
| ALT : 23 | Bilirubin : NL | Creatinine : 0.6 |
| Hepatitis serology negative | | |

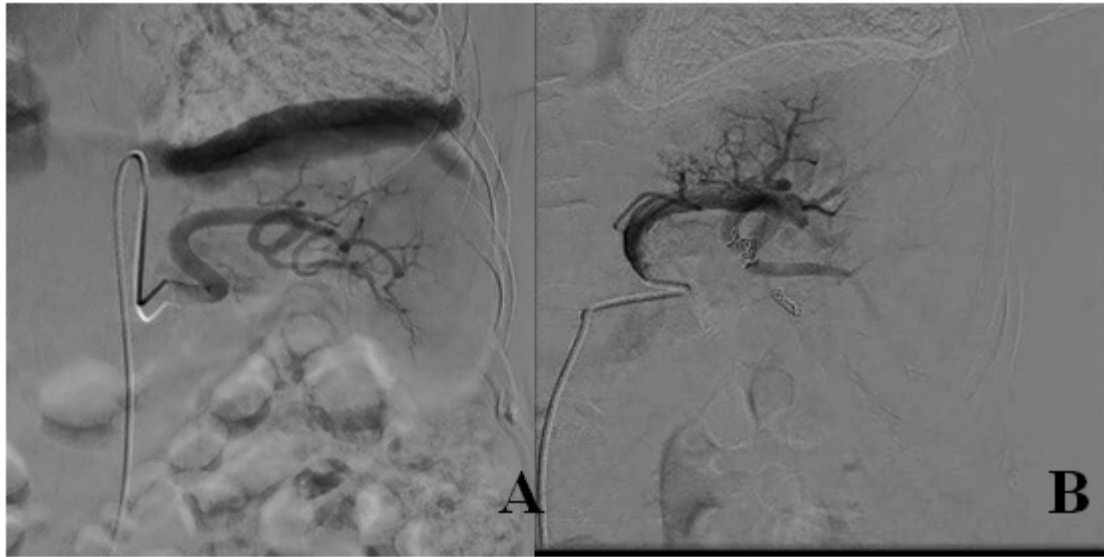


Figure 1. (A, B): mapping of the splenic artery branches: A: Angiography of the splenic artery before embolization; B: Angiography after partial embolization of the splenic artery with Embosphere and microcoil

Two days after embolization the platelet count reached the target level without transfusion, next day she developed fever chills and left hypochondrial pain. The patient underwent surgery 48 hours after SAE with platelet count $>100,000$ U/ μ L, which included right hemicolectomy and splenectomy, spleen was found to have multiple infarctions, and stayed in hospital for 5 days post-surgery before discharge home in good medical condition and returned for follow up after one week in excellent general condition without any complications, histopathology staging was T2 N3M0.

Table 2. Serial platelet count during admission

| | | | |
|-----------------------------|-----|---------------|-----|
| BEFORE GI BLEEDING: | 320 | Day 8 : | 1 |
| ON ER (first presentation): | 17 | Day 9 : | 1 |
| Day 2 : | 6 | Day 10 : | 0 |
| Day 3 : | 2 | Day 11 : | 10 |
| Day 4 : | 11 | Day 12 : * | 11 |
| Day 5 : | 5 | Day 13 : | 93 |
| Day 6 : | 11 | Day 14 : ** | 138 |
| Day 7 : | 10 | ON DISCHARGE: | 192 |

*: Day of Embolization, **: Day of surgery.
Platelet count: $*10^3$ U/ μ L.

3. Discussion

The presented case shows that splenic artery embolization can be performed successfully in patients that require splenectomy.

Long time ago, the recognition that splenectomy renders patients susceptible to lifelong risks of septic complications has led to intensive trials for splenic conservative management. In a study made in 1990 on blunt splenic trauma, the authors reported that over an 11-year study period involving 193 patients, splenorrhaphy was the most common splenic salvage method (66% overall), with non-operative management employed in only 13% of blunt splenic injuries. That report described beginning of changing in patterns of therapy [1].

In 1973, Maddison applied complete splenic artery embolization for the first time but was subsequently abandoned because of a high prevalence of complications, such as splenic rupture and splenic abscess associated with an unacceptably high mortality rate [2]. After that Mozes described the benefit of partial splenic embolization (PSE) in reducing the prevalence of complications [3].

The exact indications for SAE remain an open question, since 1970s SAE has been used in different clinical settings, including traumatic spleen rupture, splenic artery aneurysm, portal hypertension-related ascites, immune thrombocytopenic purpura, hemoglobinopathies, and hereditary spherocytosis [4]. Also use of splenic embolization in patients with autoimmune hemolytic anemia was reported [5].

Splenic artery embolization may be preferred over surgery when the aim is to preserve the immune functions of the spleen, for example, in traumatic injuries of the spleen minimal bleeding and maximal functional splenic tissue are sought. On the other hand, in patients with hypersplenism and autoimmune hemolysis the aim is to decrease the sequestration and destruction functions of the spleen while preserving its immune functions [4].

Also, Embolization can decrease the need for transfusion in patients when performed prior to splenectomy, as in our case in which patient received total of 16 platelet units before SAE, and there was no need for platelet transfusion after the procedure at all.

Some of the reported cases on studies that involved SAE as part of management were discussed here.

In liver cirrhosis, splenomegaly is a common sequale, and is frequently associated with decreased hematologic indices including thrombocytopenia and leukopenia.

In the past, in cases of severe cytopenia which may prevent treatment such as interferon therapy, or percutaneous ablation of HCC, surgical splenectomy used to be done in these situations but has been discontinued due to high mortality rate. Partial splenic embolization then has been proposed in patients with cirrhosis to resolve cytopenia and clinical complications related to hypersplenism and splenomegaly [6].

In 2009, Amin published a prospective randomized study of 40 cirrhotic patients who presented with hypersplenism, half of these patients were treated by PSE and half with splenectomy. Over the six-month follow up period both patients receiving PSE and splenectomy developed a significant increase in their leukocyte and platelet counts. Patients treated with PSE had slowly decreasing leukocyte and platelet levels during the follow up period, but still above pre-PSE levels. However, of the patients treated with splenectomy, patients had longer procedure times, longer hospitalizations, and required transfusions more frequently [7].

In 2007, Koconis also published a review of PSE in hepatitis C patients who were unable to receive antiviral therapy secondary to thrombocytopenia, because thrombocytopenia is an absolute contraindication to administration of this medication, so PSE's ability to increase platelet counts has facilitated antiviral treatment in patients who would have otherwise been too thrombocytopenic [8].

Moreover, in 2011, Yoshidome published a study about patients with both hepatocellular carcinoma and hypersplenic thrombocytopenia, this condition can severely complicate liver resection, so in that study, they demonstrated the benefit of preoperative partial splenic embolization. Five patients received PSE prior to hepatectomy, while 23 patients received concomitant splenectomy and hepatectomy. The patients in the PSE group had less blood loss, received fewer blood transfusions, and experienced fewer complications. Survival rates between the two groups were not significantly different [9].

The therapeutic effect of partial splenic embolization (PSE) was also evaluated in 13 patients with idiopathic thrombocytopenic purpura (ITP). Eight patients were treated by PSE and followed up after. PSE achieved complete remission in one case, partial response in 3 cases, minimal response in one case and no change in 3 cases. PSE had about 62% of the effective rate. The effect of PSE did not depend on background factors including age, sex, or platelet count before the treatment. Two patients needed splenectomy following PSE, one of them whose platelet count increased enough after PSE had splenectomy later and resulted in complete remission. However another patient whose platelet count did not increase enough after PSE had also no effect by splenectomy [10]. PSE in ITP management could prevent some patients from non-effective splenectomy and achieve the same effective rate as splenectomy. Therefore, PSE could be an alternative therapy of splenectomy as a less invasive choice.

SAE is gaining more attention and is considered a valuable option in non-operative management; however, risks of major and minor complications do exist, and SAE should be offered with caution and followed up appropriately, examples on the most common minor complications are including: fever in almost all patients, left upper quadrant pain in 90%, nausea in 81%, and mild left sided pleural effusion in 10% of patients [2], our patient also had on the day post-embolization high grade fever, abdominal pain and generalized fatigue, which was treated symptomatically and resolved.

On the other hand, according to a retrospective study which was published in 2004; serious complications occurred in around 20% of patients after SAE, and bleeding was the most common complication in around 11% of patients, followed by risk of infection mostly splenic abscess and iatrogenic injury such as diaphragmatic injury [11].

4. Conclusion

In summary, splenic artery embolization is a minimally invasive endovascular procedure, and might be a valuable option as a bridging therapy to surgery or as a stand-alone alternative therapy, especially in critically ill patients with disorders that contraindicate surgery due to any abnormal hematological parameter, or for preservation of splenic function in selected cases.

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