

# Partial Splenic Embolization for Hypersplenism in Cirrhotic Patients. A Case Series

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## ABSTRACT

The prognosis of liver cirrhosis depends on the presence of its major complications as well as on other factors such as hypersplenism with thrombocytopenia. Partial splenic embolization is an effective interventional procedure performed in liver cirrhosis complicated with portal hypertension to improve the low platelet count. This technique represents an efficient alternative to splenectomy, which has major drawbacks and is associated with a high morbidity. We report a series of patients with liver cirrhosis and portal hypertension who presented with severe thrombocytopenia and were treated with partial splenic embolization eventually having a favourable outcome.

**Key words:** hypersplenism – thrombocytopenia –partial splenic embolization

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## INTRODUCTION

Hypersplenism represents a common manifestation of liver cirrhosis in patients with portal hypertension. Its principal consequence, the decrease of a cell blood count, has been reported with a frequency that varies between 11% and 64% [1]. Moderate thrombocytopenia is a common finding in chronic liver disease, well-tolerated in most cases, while severe thrombocytopenia with reduction of platelet count below 50,000/mm<sup>3</sup> worsens the coagulation deficit in cirrhotic patients, favoring abnormal bleeding [2-4]. Besides platelet sequestration in the enlarged spleen, which plays a key role in thrombocytopenia development, other possible causes are involved in its pathophysiology: alcohol consumption, folate deficiency, altered platelet production, sepsis, certain drugs, immune-mediated destruction [4]. The radical intervention

for thrombocytopenia improvement is represented by splenectomy [1]. However, surgical intervention exhibits certain disadvantages and poses several risks. Postoperative morbidity is dominated by a severe syndrome known as Overwhelming post-splenectomy infection (OPSI), which is due to encapsulated bacteria such as pneumococci [5]. Total splenectomy should be avoided and limited to selected cases, the more so as it can be successfully replaced by an interventional technique with minimal complications. Compared to splenectomy, partial splenic embolization is an efficient alternative because it is associated with fewer side effects due to the preservation of sufficient splenic tissue to avoid septic complications [6-8]. Partial splenic embolization shows promising results in liver cirrhosis, increasing both the platelet and leucocytes count. Initially, several complications following this procedure have been described: splenic abscess, septicemia, pneumonia. These have been overcome by improving the technique [9].

## TECHNIQUE

We performed percutaneous catheterization of the common femoral artery using the Seldinger technique after local anaesthetic administration. The femoral artery sheath was of 6/7 French and the guide wire helped to advance the catheter through the sheath up into the aorta. Through the catheter we injected contrast medium with visualization of the celiac trunk and its branches (common hepatic artery, splenic and left gastric artery). The purpose of splenic arteriography is to depict the distribution of splenic circulation and its

collaterals. Under fluoroscopic control, selective catheterisation of splenic artery was achieved by placing a microcatheter in the superior splenic branch, as distal as possible from the hilum, using a guide wire and an MP 6/7 French guide catheter. The embolization process was performed progressively by repeated injections of a gelatin sponge suspended in contrast medium, under angiography control. The final angiography showed the results of the embolization, visualizing the embolized branches as well as the permeable splenic branches.

### CASE 1

A 69 year-old female patient had been attending our clinic for seven years with liver cirrhosis due to HCV infection. Physical examination revealed an important splenomegaly. Laboratory studies showed leucopenia of  $1,600$  leucocytes/ $\text{mm}^3$  and thrombocytopenia of  $45,000/\text{mm}^3$ , along with an abnormal hepatic status with an altered coagulation profile. Abdominal ultrasound evidenced umbilical vein repermeabilization and a dilated splenoportal axis and splenomegaly (longitudinal spleen diameter  $215$  mm). Upper digestive endoscopy detected grade III esophageal varices and repeated band ligation sessions were performed until variceal disappearance.

Because of the severe and persistent thrombocytopenia, we decided to perform splenic embolization. The superior branch of splenic artery was occluded using Gelaspon, resulting in ablation of about 50% of the splenic parenchyma assessed by CT scan (Fig. 1). After embolization, the patient developed transient abdominal pain, remitted with pain relief drugs. Improvement of the hematological parameters was observed after three days, with progressively increase of platelet count up to  $84,000/\text{mm}^3$  and of the leucocyte count (Fig. 2). Hemoglobin values were constant before and after the procedure. The patient was in good clinical condition one year after the embolization, without any adverse event post-procedure such as hypertrophy of the non-infarcted part of the spleen as demonstrated by abdominal ultrasound.

### CASE 2

A 72 year-old male patient was diagnosed three years before with alcoholic liver cirrhosis without signs of decompensation during follow-up. In the last six months, the patient developed progressive thrombocytopenia. The biological work-up showed severe thrombocytopenia of  $57,000/\text{mm}^3$ , a normal leucocyte count, mild macrocytic anemia and increased level of gamma-glutamyltranspeptidase (GGT) of  $128$  U/L. Abdominal ultrasound revealed hepatomegaly without focal masses, a dilated portal vein system without signs of portal thrombosis, spleen enlargement (spleen longest axis  $220$  mm). Upper digestive endoscopy detected portal-hypertensive gastropathy, but no esophageal varices. Because of the persistent low platelet count, partial splenic embolization was proposed. In this case, the inferior branch of splenic artery was embolized, obtaining an ablation of about 50% of splenic parenchyma (Fig. 3a, b). The postembolization course was marked by severe abdominal pain and of hemorrhagic ascites, which resolved gradually, eventually with favourable outcome. The increase in platelet count started three days



Fig. 1. CT scan: postembolization aspect

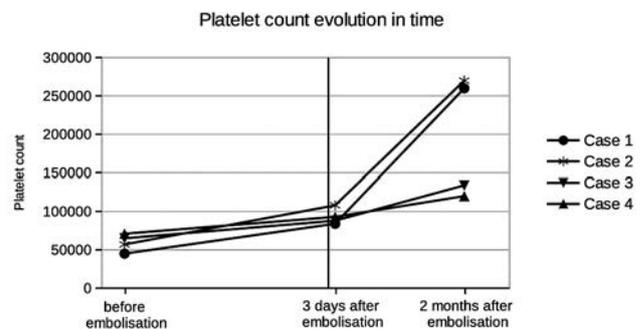
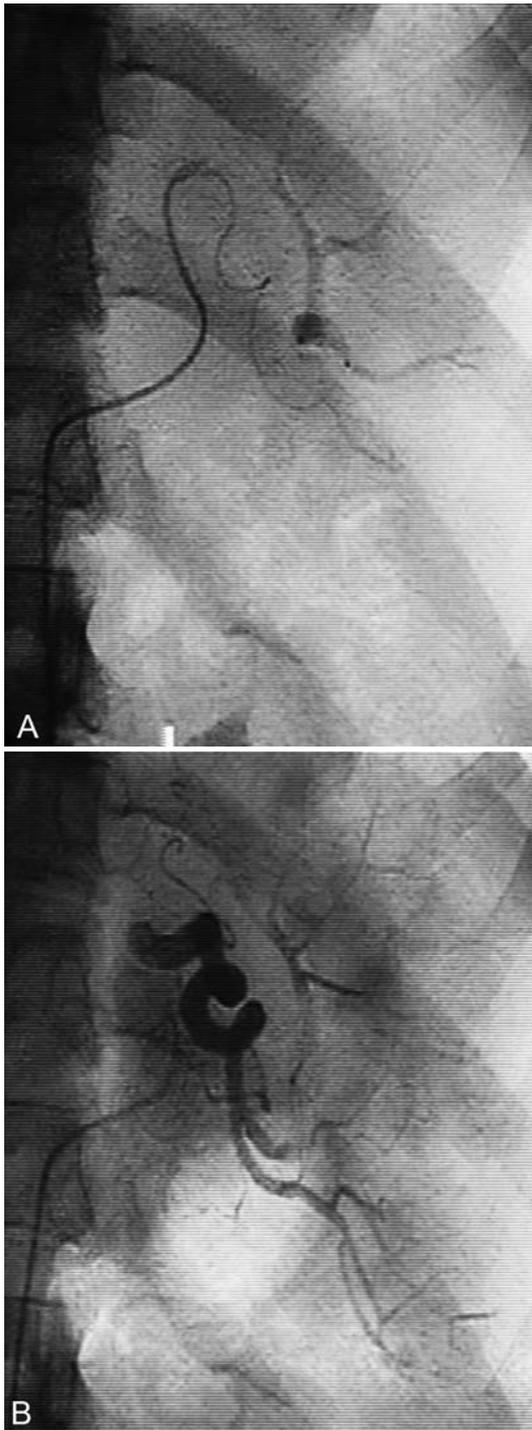


Fig. 2. Platelet count evolution in our patients.

after the procedure and persisted for six months of follow-up, being presently  $270,000/\text{mm}^3$  (Fig. 2).

### CASE 3

A 44-year old woman was recently diagnosed with compensated viral C liver cirrhosis. The biological status was normal, except the cell blood count which evidenced a moderate thrombocytopenia of  $65,000/\text{mm}^3$ . Abdominal ultrasound revealed hepatomegaly, mild splenomegaly (longitudinal axis  $163$  mm), dilated portal vein and no ascites. Upper digestive endoscopy did not detect esophageal varices. We decided that this patient was eligible for antiviral therapy, but the low platelet count was a contraindication for initiating it. Partial splenic embolization was the appropriate therapeutic option decided for increasing the thrombocyte number. The first session of embolization was inefficient, obtaining only a 20% ablation of splenic parenchyma, and no improvement of hematological parameters. After two weeks, we proceeded to a second session, with supraseductive injection of gelaspon into small branches of the splenic artery. Postprocedure, significant necrosis of splenic parenchyma was obtained as well as gradual normalization of platelet count (Fig. 2), that allowed the initiation of antiviral therapy. Six months later, the hematological parameters were within normal limits, and the tolerance of antiviral therapy was good.



**Fig. 3** A. Supraselective catheterisation of inferior branch of splenic artery with contrast injection B. Stasis of contrast medium into a small splenic arterial vessel, with preserved blood flow in other arterial splenic branches.

#### CASE 4

A 64-year old man with alcoholic cirrhosis for the last 4 years was admitted to the orthopedic clinic for a posttraumatic right femoral neck fracture. His liver disease remained stable, with no signs of decompensation. The laboratory studies evidenced a low platelet count of 71,000/mm<sup>3</sup>. Abdominal ultrasound revealed hepatomegaly and signs of portal

hypertension, but no ascites; the longitudinal spleen axis was of 170 mm. The upper digestive endoscopy performed one year before showed no esophageal varices. Taking into account that he needed a surgical osteosynthesis for the hip fracture, and thrombocytopenia was a limiting factor, we decided to perform partial splenic embolization in order to increase the platelet count. The inferior branch of the splenic artery was occluded, resulting in a significant parenchymal infarction. The postembolization course was uneventful. The patient's hematologic status improved rapidly after the procedure (Fig. 2), and the surgical intervention was performed safely.

#### DISCUSSION

Cell sequestration and destruction in the enlarged spleen play an essential role in thrombocytopenia development in cirrhosis [4]. This is also illustrated by our patient series, which confirmed the usefulness of splenic artery partial embolization in treating thrombocytopenia [6]. The rapid improvement of the platelet count started three days after the embolization, sustaining the key role of hypersplenism in thrombocytopenia development in patients with end-stage liver disease. The adverse events related to the procedure, such as transient abdominal pain and hemorrhagic ascites could be managed conservatively.

One of the reasons for choosing an interventional radiologic technique instead of a radical surgical intervention, i.e. splenectomy in these patients, is the severity of splenectomy side effects. It is well known that splenectomy is associated with high post-operative morbidity due to infections with encapsulated bacteria [6]. This complication is avoided through partial splenic embolization by preserving enough functional splenic parenchyma to prevent a severe sepsis.

The benefits of partial splenic embolization for hypersplenism correction are demonstrated by our patients. Improvement of the patient's general condition allowed the performance of a surgical intervention in one case and of antiviral treatment in another. A significant improvement of hematologic parameters was obtained when the necrotised splenic parenchyma exceeded 50%.

#### CONCLUSION

Splenic embolization might provide a safe alternative to surgery for treating thrombocytopenia in patients with liver cirrhosis.

**Conflicts of interest:** None to declare.

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