

## Iatrogenic splenic injury after thoracentesis in a patient with a ventricular assist device system

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Although gastrointestinal complications which develop following cardiac procedures are rare, they potentially progress with high rates of morbidity and mortality [1]. Thoracentesis-related splenic injury, on the other hand, is a very rare complication. Indeed, the most common major complication that develops related to thoracentesis is pneumothorax [2]. Patients with severe cardiac failure and complicated dilated cardiomyopathy might need left ventricular assist device (LVAD) implantation. This method is used as bridging treatment for future cardiac transplantations. We successfully performed splenectomy on our patient who had had thoracentesis-related splenic injury on the 2<sup>nd</sup> post-operative day following LVAD implantation because of dilated cardiomyopathy.

The 35-year-old male patient was examined at the intensive care unit (ICU) as he had abdominal distension and a low hematocrit (hct) level. We were informed that the patient, who had been diagnosed with dilated cardiomyopathy, had received HeartMate III (Thoratec Inc., Pleasanton, CA, USA) implantation + tricuspid partial De Vega annuloplasty as a bridging procedure for cardiac transplantation two days before. We also learnt that the patient had contracted sudden abdominal distension and had a low level of hct following thoracentesis which had been performed as the patient had developed pleural effusion during his follow-up. Examination of the patient revealed that his arterial blood pressure was 50/35 mm Hg in spite of inotropic support, his heart rate was 130/min, and he was conscious, oriented, and cooperative. His abdomen was severely distended as well.

The patient's laboratory results were as follows: hct 17%, hemoglobin 6 g/dl, thrombocytes 114 000 mm<sup>3</sup>, and international normalized ratio (INR) 1.8. Adequate hemodynamic stabilization and 3 packaged red cell transfusions were performed. The patient had emergency abdominal computed tomography (CT), and his CT results demonstrated that his spleen size had dramatically expanded, showing images rich in heterogeneous density which caused the obstruction of splenic contours which were evaluated to be in favor of hematoma in the subcapsular area, and perihepatic images consistent with diffuse hemorrhage in the pelvic area (Figures 1 A, B).

We planned to perform a surgical procedure as the patient was on anticoagulant and antiaggregant treatment and had extensive intraabdominal hemorrhage. At laparotomy, about three liters of intraperitoneal blood were evident. Exploration performed after the drainage showed active bleeding in two foci which were thought to be possibly related

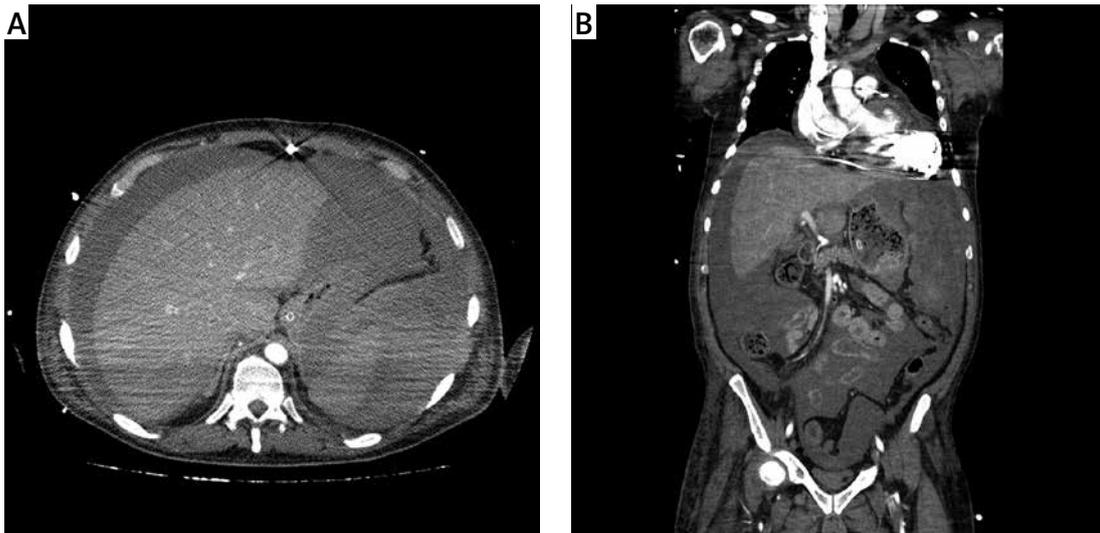


Figure 1 A, B. Image of perihepatic and perisplenic diffuse hemorrhage and LVAD as shown by CT

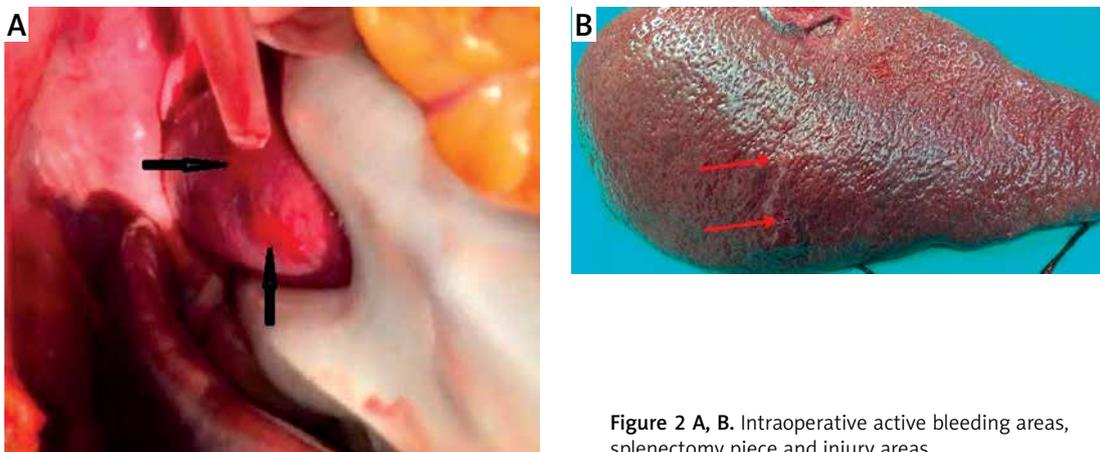


Figure 2 A, B. Intraoperative active bleeding areas, splenectomy piece and injury areas

to the thoracentesis procedure in the spleen (Figures 2 A, B). These areas were compressed for about 15 min, but the bleeding did not stop. The patient underwent splenectomy as he was on anticoagulant and antiaggregant treatment; we also took the continuation of these treatments into consideration. Clopidogrel and warfarin treatment was continued after the procedure. The patient, who was taken to the ward on the 2<sup>nd</sup> post-operative day, was discharged without any problems on post-operative day 15. Our patient has been waiting for a heart transplant for about 6 months.

HeartMate and similar devices are used for acute or chronic last stage cardiac disease to keep patients alive until matching hearts are found before heart transplantation (bridging to transplantation) [3]. Bleeding, infection, thromboembolism, and right ventricular failure are among the complications observed after LVAD implantations [4]. Also, pleural effusion occupies an important role among the complications occurring after cardiac surgical procedures. Thoracentesis is frequently

applied for the treatment of post-operative pleural effusions.

Thoracentesis is regarded to be a relatively safe procedure. The risk of pneumothorax has been reported to be as high as 20–39% in spite of this impression [2, 5]. Moreover, hemothorax, pleural infection, reexpansion edema, pulmonary embolism, and subcutaneous emphysema can be listed among other major complications. Thoracentesis-related splenic injury is very rare [2, 5]. Seneff *et al.* [2] in their 125-case study and Collins *et al.* [6] in their 129-case study each reported one case of thoracentesis-related splenic injury. There are only a couple of case-based reports in the literature, as is the case with these studies [7, 8]. The present case is the first iatrogenic splenic injury after thoracentesis in a patient with a ventricular assisted device system in the literature.

Inexperience of the physician performing the procedure, the presence of a small amount of loculated fluid, thick parietal pleura, inability to achieve the cooperation of the patient, failure to perform the procedure guided by ultrasound, and

being on a mechanical ventilator are among the factors that increase the risk of thoracentesis-related complications[2, 5]. There are studies which have reported that ultrasonography-guided (USG) thoracentesis was a safer and easier method to implement [6, 9].

There are no other definitive contraindications other than the unwillingness of patients to have this procedure. Relative contraindications, however, include the presence of bleeding diathesis, thrombocyte count lower than 25 000, and the value of the prothrombin time (PT)/partial thromboplastin time (PTT)/INR being over double its normal level [9]. Our patient was on clopidogrel, acetyl salicylic acid, and warfarin. His preoperative thrombocyte count was 114,000, while his INR value was 1.8.

Computed tomography is the gold standard for the investigation and staging of splenic injuries. Non-operative management generally proves to be successful if the splenic hilus is not impaired (even when there is capsule impairment) based on CT scan results [10]. However, in patients receiving antiaggregant and anticoagulant treatment, as was the case with our patient, serious bleeding related to splenic injury can happen even after only thoracentesis. These cases most likely necessitate surgical intervention.

Consequently, thoracentesis is generally regarded to be a safe method. It is, however, safer to perform it guided by USG in risky patients and especially in those receiving anticoagulant and antiaggregant treatment following cardiac surgery. Abundant bleeding and hemorrhagic shock can occur in patients with splenic injury while receiving anticoagulant and antiaggregant treatment. Splenectomy should be performed in such cases as soon as possible.

### Conflict of interest

The authors declare no conflict of interest.

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