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Interventional Radiology

Ultrasound-guided percutaneous periarterial thrombin injection for paracentesis-related hemoperitoneum

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ABSTRACT

Paracentesis is a common procedure used in the diagnostic evaluation of peritoneal fluid as well as the therapeutic removal of high-volume ascites. Although generally regarded as a safe procedure, complications may arise from arterial injury, including hematomas and pseudoaneurysms. Transcatheter embolization and surgery are first-line interventions for injuries refractory to conservative management. We present a case where a patient failed conventional therapies for hemoperitoneum following a paracentesis which resolved after thrombin injection into the subcutaneous tissues, a novel use for thrombin. Using a linear 12-3 MHz transducer, approximately 3000-3500 U of thrombin was injected through connecting tubing and a 25-gauge needle by the interventional radiologist into the subcutaneous tissues around the origin of the arterial hemorrhage. The bleeding ceased and the patient's hemoglobin and hemodynamics stabilized.

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Case report

A 50-year-old man presented to the emergency department with a 2- to 3-day history of progressively worsening unsteady gait, weakness, and somnolence. His medical history included systolic heart failure (ejection fraction of 21%), remote orthotopic liver transplantation for alcohol- and hepatitis C-induced cirrhosis, and acute renal failure requiring hemodialysis. He reported nonadherence to his immunosuppressant medications (tacrolimus and everolimus) for at least 4 months. His laboratory results at presentation were a creatinine of 6.1 mg/dL, blood urea nitrogen of 23 mg/dL, prothrombin time of 15.9

seconds, partial thromboplastin time of 35 seconds, and international normalized ratio of 1.5. The patient had leukocytosis of $13.4 \times 10^9/L$ and underwent a diagnostic and therapeutic paracentesis without image guidance performed by the critical care team using a 5Fr Yueh centesis catheter needle (Cook Medical LLC, Bloomington, IN). Two liters of bloody ascitic fluid was drained. No evidence of spontaneous bacterial peritonitis was found on workup of the fluid sample. However, due to concern for sepsis from another source, the patient was started on broad-spectrum antibiotics with vancomycin and piperacillin/tazobactam. Overnight, the patient became hypotensive to 73/35 mm Hg and his hemoglobin dropped from 7.4 to 5.6 gm/dL. Following 3 units of packed red blood cells, 1 L of

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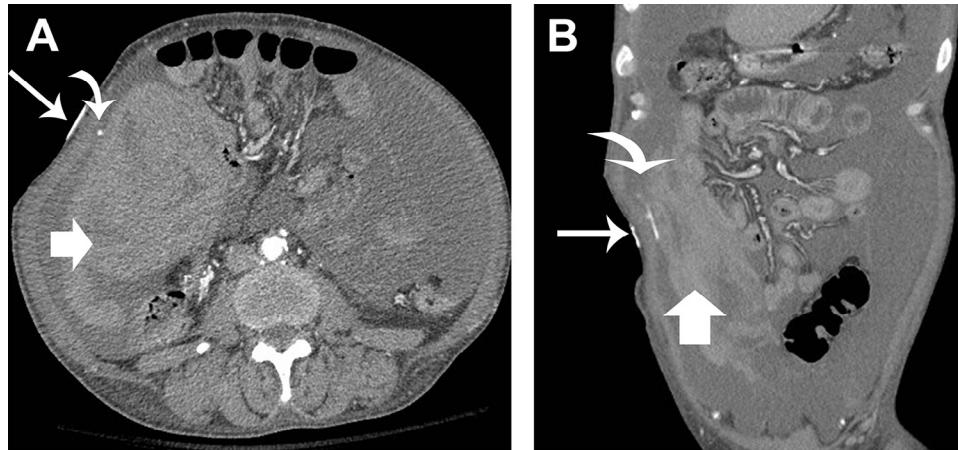


Fig. 1 – Axial (A) and coronal (B) images from a contrast-enhanced computed tomography scan showing bandage over the site of paracentesis (long arrow), extravasation of contrast indicating active bleeding (curved arrow), and a large intraperitoneal blood clot (short arrow).

Ringer's lactate, 75 g of albumin, and 1 unit of fresh frozen plasma, his hemoglobin improved to 7.1 mg/dL and his hemodynamics normalized. Vasopressor medications were not initiated.

A computed tomography of the abdomen and pelvis with and without contrast demonstrated intraperitoneal active extravasation at the right lateral abdomen, presumably at the site of prior paracentesis (Fig. 1). Injury to the right inferior epigastric artery or an intercostal artery was suspected.

The patient was taken to the interventional radiology fluoroscopy suite and positioned supine. The right groin was prepped and draped in normal sterile fashion, the right common femoral artery was accessed under ultrasound-guidance with micropuncture technique, and a wire was advanced centrally. A 5Fr sheath was placed. A 5Fr Mikaelson catheter (Angiodynamics, Lathan, NY) was used to select the right 10th, 11th, and 12th intercostal arteries. These distinct catheterizations were followed by their corresponding

arteriograms. The 11th and 12th intercostal artery angiograms showed irregularity associated with the external marker placed at the site of paracentesis, suggesting possible involvement (Fig. 2A). Sequential selection using a microcatheter and embolization of the right 11th and 12th intercostal arteries using gelatin foam that had been made into a slurry was then performed. Completion angiogram showed successful occlusion of these vessels (Fig. 2).

The patient's hemoglobin again decreased to 5.6 mg/dL the following day. Repeat computed tomography of the abdomen and pelvis with contrast demonstrated persistent arterial extravasation (Fig. 3). The patient required an additional 3 units of packed red blood cells, 2 units of fresh frozen plasma, and 1 dose of a prothrombin complex concentrate. Again, vasopressors were not initiated. The critical care, interventional radiology, and surgical teams discussed treatment options. Conservative management was implemented. The patient was deemed too high risk of surgical intervention

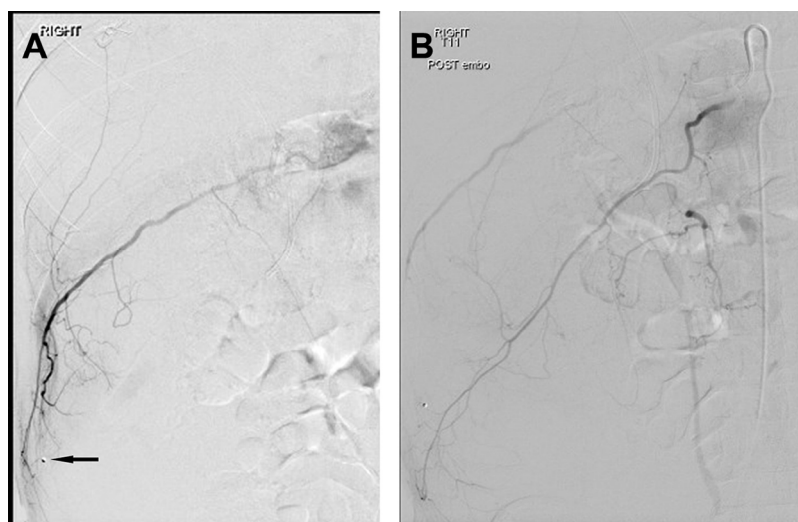


Fig. 2 – Digital subtraction angiographic images of the right T11 and T12 intercostal arteries before (A) and after (B) gel-foam embolism. Note the bead to denote site of paracentesis (thin arrow).

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