Case Report: ER-REBOA™ Catheter

Deployed in Non-trauma, Hemorrhagic Shock Patient with Retroperitoneal Hemorrhage, Renal Perforation and Splenic Laceration

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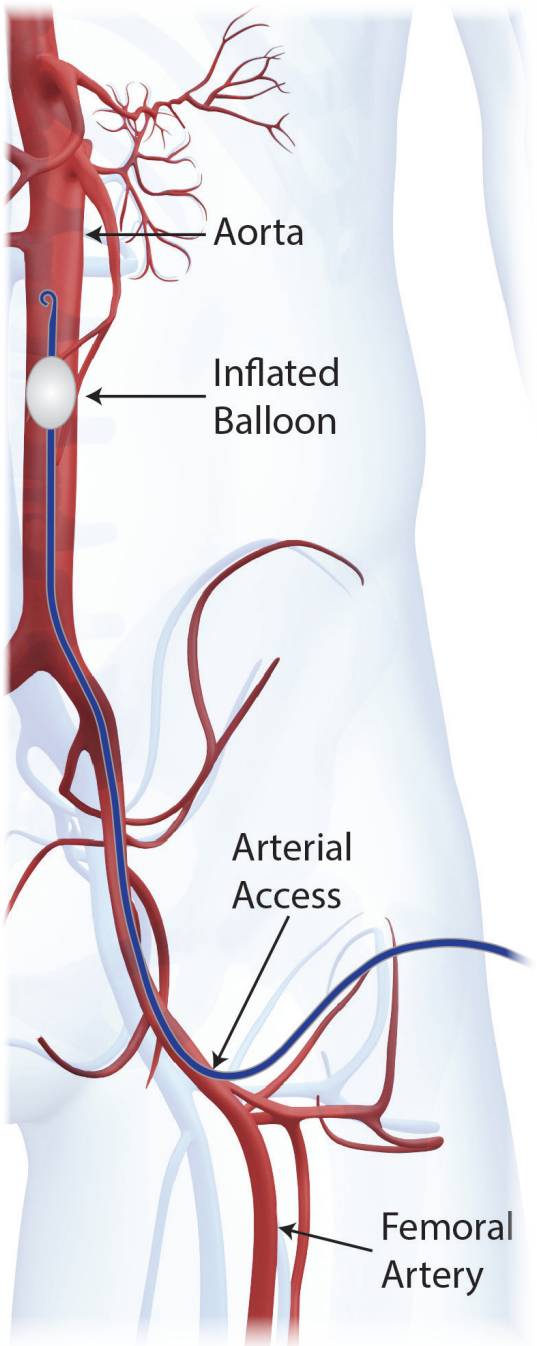

Presentation

A 39-year-old male presented to a community hospital with a one-day history of back pain. It was discovered that he had a history of multiple tricuspid valve replacements from endocarditis as well as a significant history of intravenous drug use. At the time of presentation, the patient was on coumadin and his international normalized ratio (INR) was 6.7. He was noted to have a large right-sided retroperitoneal hematoma and received10 units of fresh frozen plasma (FFP), 6 packed red blood cell (PBRC) units, and 1 unit of platelets (PLT) at an outside hospital, improving his INR to 2.0. However, due to his substantial transfusion, he developed abdominal compartment syndrome (ACS). He was intubated and started on vasopressors. A paramedic team transferred him to University of Maryland Medical Center for higher level of care.

Diagnosis

Once the patient was in the Critical Care Resuscitation Unit, he was evaluated quickly and noted to be tachycardic, hypotensive, hypothermic and have a firm, distended abdomen, consistent with ACS.

Course of Care

The patient was taken to the operating room immediately. An ER-REBOA™ Catheter was placed perioperatively, due to the patient's hemodynamic lability and possible worsening hemodynamics with release of abdominal tamponade. A 7 Fr sheath was placed in the right common femoral artery using ultrasound guidance. The ER-REBOA™ Catheter was placed in Zone I (Figure 1) and inflated on entry into the peritoneum per guideline[1]. A large right-sided retroperitoneal hemorrhage was encountered with right renal perforation as well as a splenic laceration. The right kidney and spleen were removed. The patient required a significant transfusion of 15 PBRC units, 15 FFP units, and one PLT unit. The ER-REBOA™ Catheter was deployed for 20 minutes for proximal control and stabilization of the patient's hemodynamics. The balloon was removed. An angiogram via the sheath showed good 3 vessel runoff. Due to coagulopathy and ongoing oozing, the abdomen was left open with hemostatic packing, a temporary abdominal dressing and the 7 Fr sheath in place. The patient had continued pulse checks that did not change. The patient required one additional return to the OR during the night of surgery due to

oozing, requiring repacking. Once the coagulopathy was corrected, he was taken back to the OR for definitive closure. The sheath was removed in the OR with direct pressure held for 30 minutes. Palpable pulses were noted bilaterally, and a groin ultrasound performed 24-hours later showed no access site complications.

Patient Outcome

Postoperatively, the pathology revealed right renal multifocal papillary renal cell carcinoma, Furman grade 1. He was seen by the urology and oncology departments for outpatient treatment. Clinically, he did require dialysis for acute kidney insufficiency and hyperkalemia that resolved. He also developed ischemic hepatitis with elevated bilirubin and transaminitis that all resolved. He was discharged to acute rehabilitation on Day 13 post operation and was seen for follow up in clinic at one and three months with no additional issues. The patient is currently being monitored for his renal cell cancer, with no additional treatment required, due to the small size of the tumor.

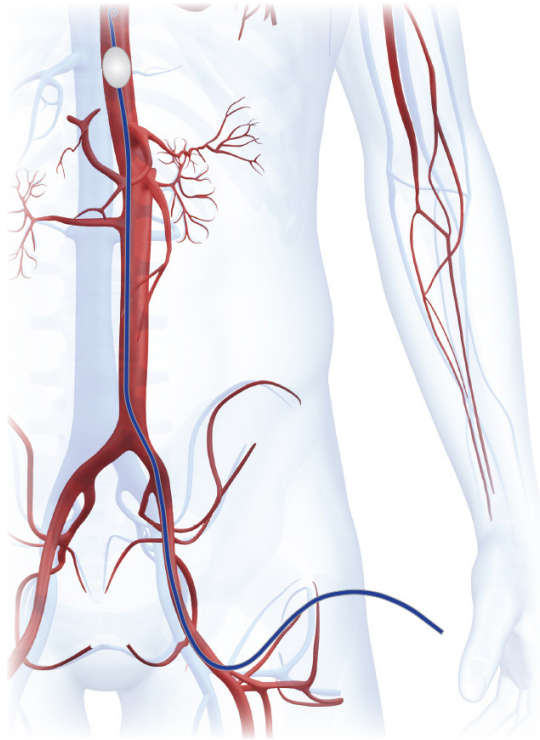

Figure 1. Illustration of Zone 1 placement of balloon using the ER-REBOA™ Catheter.

Considerations

- This patient had ACS due to a massive transfusion that exacerbated his hypotension from acute blood loss anemia.
- The patient clearly needed an abdominal operation to relieve the pressure and obtain source control. However, with abdominal decompression, any tamponade effect from the abdominal wall is lost, once an incision is made[2].
- Since the patient was hemodynamically labile, requiring vasopressors and ongoing transfusions, we opted to place the ER-REBOA™ Catheter in Zone I.
- With the catheter, we were able to both aid in hemodynamic stability on initial entry into the abdomen and for proximal control of the retroperitoneal hematoma until source control could be obtained.
- Once the kidney and spleen were removed, the balloon was taken down in order to perfuse the remainder of the abdominal viscera and lower extremities. This limited ischemia time to the remainder of the body.
- Additional considerations for this patient could have included using a prothrombin complex concentrate (PCC) in an attempt to reverse his initial life-threatening coagulopathy from coumadin, as this approach uses a much smaller volume of infused fluid[3]. This could have led to less blood product volume administration, potentially avoiding ACS.

References:
1. Prytime Medical Devices, Inc. website / package insert
2. Backer DD. Abdominal compartment syndrome. Critical Care. 1999;3(6):R103-R104. doi:10.1186/cc373.
3. Joseph SA, Restivo, DO, Karafin MS. Chapter 34: Plasma Products. In: Shaz BH, Hillyer CD, Gil, MR, eds. Transfusion Medicine and Hemostasis Clinical and Laboratory Aspects. 3rd Ed. Cambridge, MA: Elsevier; 2019.

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