

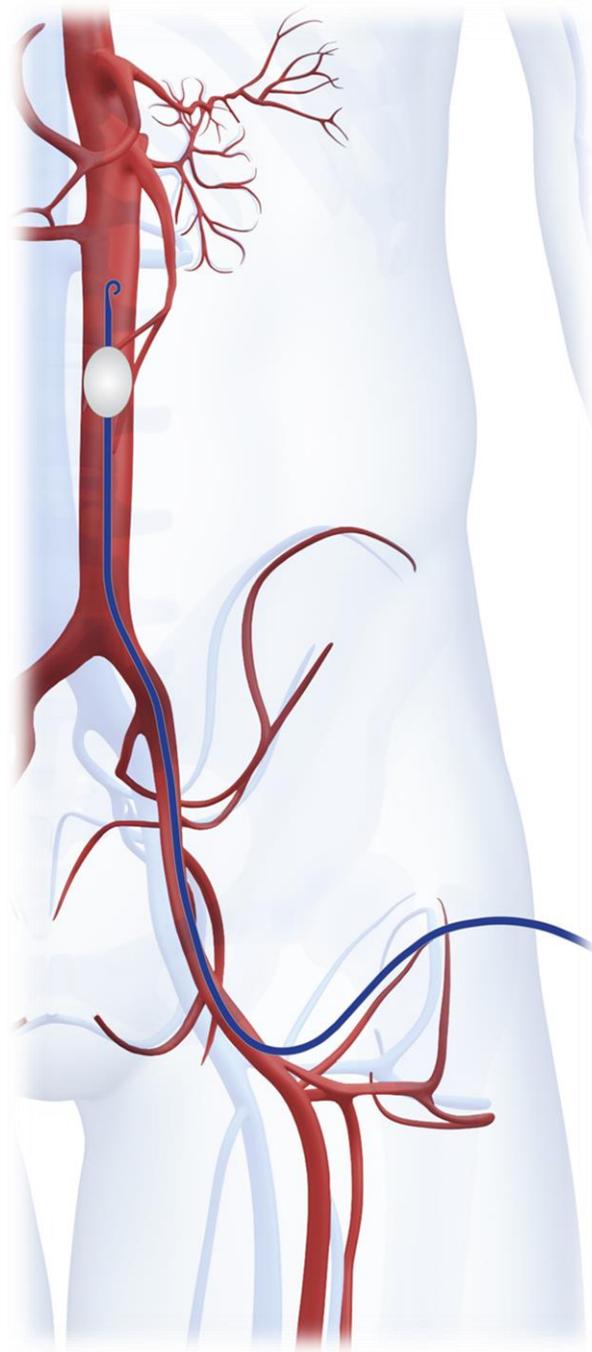
Case Report: ER-REBOA™ Catheter

Use of REBOA in repair of retrohepatic vena caval injury

Gregory R. Semon, DO, FACS, FACOS

Assistant Professor, Division of Trauma and Acute Care Surgery

Wright State University Department of Surgery, Dayton, OH



Presentation

A 23-year-old male was injured in a motor vehicle accident in which he was partially ejected out of the windshield. He presented with profound hemorrhagic shock; therefore, the massive transfusion protocol was activated. FAST ultrasound revealed free fluid in the abdomen, and the patient's blood pressure was 78 over palp.

Course of Care

The team decided that REBOA may be needed, and a right common femoral arterial line was placed [1]. Chest x-ray demonstrated bilateral pneumothoraxes prompting chest tube placement, but no mediastinal widening was seen. Shortly thereafter, the patient crashed; thus, CPR was initiated and the team elected to proceed with aortic balloon occlusion instead of resuscitative thoracotomy [2]. The ER-REBOA™ Catheter was then deployed in Zone I, and placement was confirmed with x-ray (3). The balloon was inflated with an 8cc volume per guideline [3], and the blood pressure immediately recovered (114/74) allowing the patient to be taken to the operating room (OR).

Once in the OR, the patient was found to have severe injuries including a challenging injury to the retrohepatic vena cava. Use of the REBOA controlled hemorrhage and enabled the completion of a right hepatectomy, splenectomy, distal pancreatectomy and a right hemicolectomy, and primary repair of the retrohepatic vena cava injury (Figure 1). The ER-REBOA™ Catheter was deployed for a total of 149 minutes for proximal control and stabilization of the patient's hemodynamics. During the surgeries, the balloon was inflated and deflated 5 times—3 rounds were complete deflation/inflation and 2 were partial [4]. A temporary abdominal closure was performed. The patient required a total transfusion of 37 packed red blood cell units, 35 units of plasma, 4 units of platelets, and 7 units of cryoprecipitate in addition to CellSaver®. The balloon and catheter were removed at the end of the surgery, and the sheath was left in place.

Patient Outcome

Postoperatively, the patient recovered in the ICU, and his abdomen was able to be closed within 7 days. Importantly, there were no complications (acute kidney injury, bowel ischemia, etc.) that could be attributed to the 149 minutes of REBOA use [5]. Further, there were no complications noted in the leg distal to the sheath [6]. He was discharged to home on post-operative day 13 in good condition.



The REBOA Company™

www.prytimemedical.com

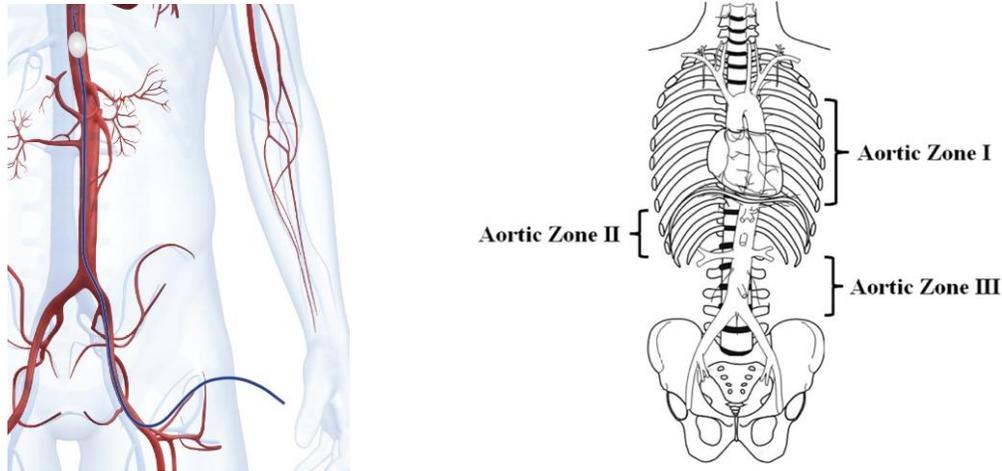


Figure 1. 23-year-old male in motor vehicle accident with an ER-REBOA™ Catheter deployed to Zone I. The catheter enabled the completion of a right hepatectomy, splenectomy, distal pancreatectomy and a right hemicolectomy, and primary repair of the retrohepatic vena cava injury.

Considerations

- Clamping the thoracic aorta unnecessarily opens an uninjured cavity and offers no advantage over REBOA.
- Surgeons should record how often and how long the balloon is inflated. Partial occlusion was pivotal to the success of this surgery. It allows the surgeon to prevent the incidence of ischemia in the extremities and organs, while at the same time, evoking hemorrhage control and stabilizing the injury.
- Early access is key. If REBOA is even a possibility, placing the arterial line early enables the therapeutic option. In this case, the sheath was already in place when the pulse was lost, enabling the use of REBOA to stabilize the blood pressure after resuscitation.
- The use of REBOA avoided the morbidity of a resuscitative thoracotomy that would have otherwise been performed for aortic cross-clamping.

References:

1. Romagnoli A, Teeter W, Pasley J, Hu P, Hoehn M, Stein D, Scalea T, Brenner M. Time to aortic occlusion: It's all about access. *J Trauma Acute Care Surg.* 2017 Dec;83(6):1161-1164.
2. Brenner M, Inaba K, Aiolfi A, DuBose J, Fabian T, Bee T, Holcomb JB, Moore L, Skarupa D, Scalea TM; AAST AORTA Study Group. Resuscitative Endovascular Balloon Occlusion of the Aorta and Resuscitative Thoracotomy in Select Patients with Hemorrhagic Shock: Early Results from the American Association for the Surgery of Trauma's Aortic Occlusion in Resuscitation for Trauma and Acute Care Surgery Registry. *J Am Coll Surg.* 2018 May;226(5):730-740.
3. Prytime website/package insert.
4. DuBose JJ. How I do it: Partial resuscitative endovascular balloon occlusion of the aorta (P-REBOA). *J Trauma Acute Care Surg.* 2017 Jul;83(1):197-199.
5. Davidson AJ, Russo RM, Reva VA, Brenner ML, Moore LJ, Ball C, Bulger E, Fox CJ, DuBose JJ, Moore EE, Rasmussen TE; BEST Study Group. The pitfalls of resuscitative endovascular balloon occlusion of the aorta: Risk factors and mitigation strategies. *J Trauma Acute Care Surg.* 2018 Jan;84(1):192-202.
6. Reynolds CL, Celio AC, Bridges LC, Mosquera C, O'Connell B, Bard MR, DeLa'o CM, Toschlog EA. REBOA for the IVC? Resuscitative balloon occlusion of the inferior vena cava (REBOVC) to abate massive hemorrhage in retrohepatic vena cava injuries. *J Trauma Acute Care Surg.* 2017 Dec;83(6):1041-1046.