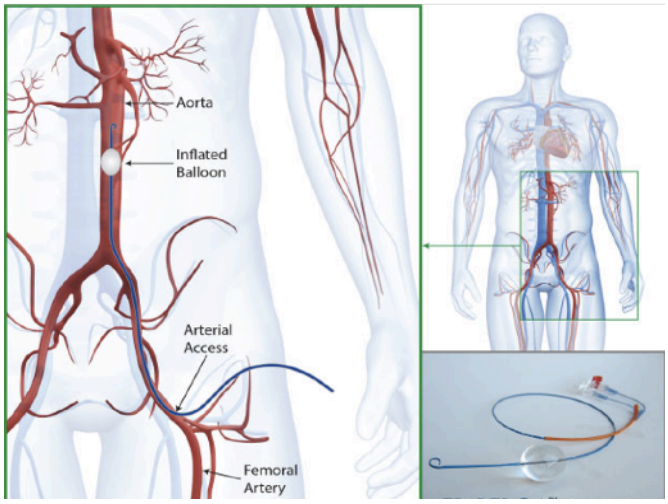
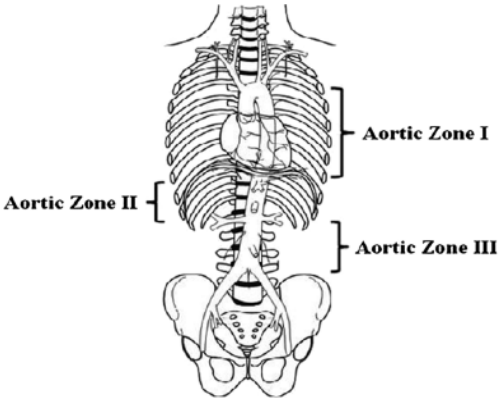
REBOA

Resuscitative Endovascular Balloon Occlusion of the Aorta

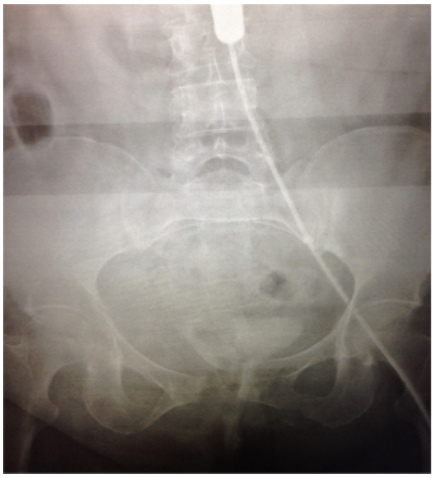
In a battlefield hospital in Korea more than 50 years ago, a surgeon fought to save the lives of three critically injured soldiers who were bleeding out. With nothing to lose, he tried a never-before-attempted technique: threading a balloon catheter through the femoral artery into the thoracic portion of each soldier's aorta and inflating the balloon to occlude blood flow and increase life-sustaining blood pressure and perfusion to the heart and brain. Unfortunately all of the three soldiers eventually died, but the procedure lives on[1]. REBOA stands for Resuscitative Endovascular Balloon Occlusion of the Aorta and the procedure is now gaining traction among trauma experts. With new technology the ER-REBOA catheter has been engineered to be small and easy to use. With a catheter size of 7-French, the risk of injury to the access vessel is minimal and the procedure can be done quickly in an emergency setting.



Pre-hospital and in the ED, we often see patients in hemorrhagic shock due to traumatic injuries in non-compressible areas of the body such as the chest, abdomen, or pelvis. Traditionally, a resuscitative thoracotomy for aortic compression would be performed either in the ED or the OR to temporize the peri-arrest patient until definitive surgical management could be accomplished. REBOA offers a new solution to this problem. The thought is that myocardial and cerebral tissue perfusion can be preserved using this less invasive technique[2]. Proposed indications for REBOA include refractory hemorrhagic shock, blunt or penetrating abdominal trauma, pelvic fractures causing pelvic hemorrhage, ruptured abdominal aortic aneurysms, or a crashing trauma patient with no obvious cardiac injury on ultrasound[2-4]. The procedure involves obtaining arterial access through the common femoral artery, passing a vascular sheath, floating a balloon catheter to the appropriate section of the aorta, and inflating the balloon to occlude blood flow[2]. The catheter contains two lumens, one of which inflates the balloon and the other that can be used as a central arterial line or to monitor arterial blood pressure. The balloon is then inflated into one of three zones. Balloon occlusion is performed in Zone 1 for abdominal injuries or Zone 3 for pelvic injuries, while Zone 2 is a proposed no-occlusion zone[2]. The balloon may then be left inflated for up to 40-60 min, or until hemodynamic stability is achieved[5].



This pioneering technique is now even being used overseas in the pre-hospital environment. In 2014, London's Air Ambulance carried out the first successful roadside REBOA on young girl with massive pelvic trauma[6]. In 2015, the ER-REBOA catheter was approved by the FDA for use in the US and shortly after was used at Denver Health ER to save the life of a Police Officer who sustained a gun shot wound to the abdomen[7-8]. In 2016, the Western Trauma Association added REBOA to the algorithm for Management of Pelvic Fractures with Hemodynamic Instability[9]. With REBOA's growing success, it is only a matter of time until it is utilized more frequently outside of the OR setting and used as a temporization measure for referral centers prior to transferring patients to a Level 1 Trauma Center[3]. Temporization with REBOA is a promising new frontier, although the exact role is yet to be determined. As an adjunct to traditional measures, REBOA may offer patients one last hope and provide that golden hour until definitive care is reached.



For further information visit:

- EMCRIT links to REBOA podcasts
  http://emcrit.org/podcasts/er-reboa
- EMCrit Podcast 170
  The ER REBOA™ Catheter with Joe DuBose 03/2016
- EMCrit Podcast 133
  The First Prehospital REBOA 09/2014
- EMCrit Podcast 121
  REBOA 04/2014
- FlightBridgeED Podcast
  REBOA with Dr. Zaffer Qasim 05/20/2016
- ERCast - REBOA 101
  http://blog.ercast.org/reboa 2/12/2017

References:

1) Hughes CW, et al. Use of an intra-aortic balloon catheter tamponade for controlling intra-abdominal hemorrhage in man. Surgery 1954; 36(1):65-8

2) Stannard, Eliason, Rasmussen. Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) as an Adjunct for Hemorrhagic Shock. J Trauma 2011; 71(6):1869–72

3) Martinelli et al. Intra-Aortic Balloon Occlusion to Salvage Patients with Life-Threatening Hemorrhagic Shocks from Pelvic Fractures. J Trauma 2010; 68(4):942–8

4) Brenner et al. A Clinical Series of Resuscitative Endovascular Balloon Occlusion of the Aorta for Hemorrhage Control and Resuscitation. J Trauma Acute Care Surg 2013; 75(3):506–11

5) Avaro et al. Forty-Minute Endovascular Aortic Occlusion Increases Survival in an Experimental Model of Uncontrolled Hemorrhagic Shock Caused by Abdominal Trauma. J Trauma 2011; 71(3):720–725

6) London's Air Ambulance Wins Pride of Britain Award. EMS World News. October 31, 2016. http://www.emsworld.com/news/12274921/londons-air-ambulance-wins-pride-of-britain-award

7) Pryor Medical Devices Receives FDA 510(k) Clearance for Distribution of Its ER-REBOA Catheter. PR News Wire. October 31, 2015. http://www.prnewswire.com/news-releases/pryor-medical-devices-receives-fda-510k-clearance-for-distribution-of-its-er-reboa-catheter-300165805.html

8) Revolutionary surgery helped save life of Denver police officer who was shot. Fox News Media Segment. December 17, 2015. http://kdvr.com/2015/12/16/revolutionary-surgery-helped-save-life-of-denver-police-officer-who-was-shot/

9) Tran, Thai Lan N. (2016). Western Trauma Association Critical Decisions in Trauma: Management of pelvic fracture with hemodynamic instability 2016 updates. Journal of Trauma and Acute Care Surgery, 81(6), 1171–1174.