SUCCESSFUL UTILIZATION OF RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA, REBOA, IN A PEDIATRIC PATIENT

WakeMed Health & Hospitals, Raleigh NC

Alexis Pulizzi, Scott Moore, Anquonette Stiles, Sarah McIntyre

Background: We describe the use of resuscitative endovascular balloon occlusion of the aorta (REBOA) in a pediatric female who presented following blunt trauma with hemorrhagic shock and devastating TBI. Few patients survive this type of injury with standard interventions. The purpose of this report is to discuss the value of REBOA in achieving hemodynamic stability in this patient population, where the possibility of organ donation can be preserved even when patient survival is considered unlikely.

Case Report

History: A 14 yr old female was found in extremis by EMS following a high speed MVC, with on-scene arrest followed by ROSC. She was transported to the closest hospital, where initial stabilization efforts were performed and air transport to our institution was arranged.

Figure 1. ER-REBOA Plus Catheter (Prytime Medical)

Examination: Upon trauma bay arrival, the patient had a GCS of 3T with a SBP in the 70s. A FAST exam was positive on abdominal views. Chest x-ray was normal, and pelvic x-ray did not show a fracture, which was discordant with the pre-hospital report. Non-compressible torso hemorrhage was strongly suspected. FAST, chest x-ray, and pelvic x-ray results suggested shock due to visceral abdominal hemorrhage was most likely.

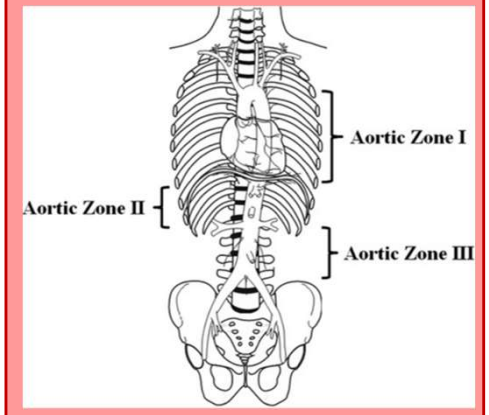

Figure 2. Aortic occlusion zones. The first, left subclavian artery origin to celiac artery. Second, celiac artery to lowest renal artery. The third, lowest renal artery to aortic bifurcation.[1]

Intervention: An ER-REBOA (Prytime Medical, Boerne, TX) was inserted into the common femoral artery under ultrasound guidance with balloon advancement to zone 1 based on landmarks. Upon inflation, occlusion immediately elevated SBP to 130-140 mmHg.

During laparotomy, a large liver laceration and hemoperitoneum was noted. Upon hepatic packing and blood replacement, the patient stabilized and the REBOA balloon was deflated and removed. The patient was left open and transferred to the PICU for further resuscitation. The femoral sheath was removed several hours following return to the ICU. She returned 48hrs later for removal of packing and fascial closure.

Outcome: Brain imaging revealed cerebellar tonsillar herniation, and the patient's neurologic exam further worsened with loss of all brainstem reflexes. Brain death was confirmed using a radionuclide cerebral-blood-flow study. The patient remained hemodynamically stable for three days without complications from balloon catheter placement. The family was approached about organ donation and ultimately agreed.

Discussion: REBOA is a reliable technique to temporarily attenuate non-compressible torso hemorrhage, support cardiac and brain perfusion, and regain hemodynamic stability in pediatric patients. Here we describe use of REBOA in a 14 yr old female with major blunt abdominal and neurologic injury. Successful REBOA insertion into zone I provided rapid hemodynamic restitution, which permitted definitive hemorrhage control in the OR. Unfortunately, this patient had a severe TBI and hemorrhage control alone was not sufficient for patient salvage. However, despite this unfortunate outcome, maintenance of organ perfusion allowed for fulfillment of the family's wishes for organ donation.

Mortality rates for REBOA in children remain around 70%, though most of these deaths are likely due to the severity of injuries and not the procedure itself. Expanded use of REBOA among pediatric patients holds promise.

References

1. Stannard A, Eliason JL, Rasmussen TE. Resuscitative endovascular balloon occlusion of the aorta (REBOA) as an adjunct for hemorrhagic shock. J Trauma. 2011 Dec;71(6): 1869-72. doi: 10.1097/TA.0b013e31823fe90c. PMID: 22182896.