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Procedures and Techniques

PROCEDURES AND TECHNIQUES

How I do it: Partial resuscitative endovascular balloon occlusion of the aorta (P-REBOA)

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Resuscitative endovascular balloon occlusion of the aorta (REBOA) continues to evolve as a potentially viable tool of modern trauma resuscitation.¹⁻⁵ Although optimal patient selection and techniques continue to be refined, REBOA has emerged as a practical tool that can be used in the care of patients with noncompressible truncal hemorrhage (NCTH) who fail to respond adequately to other resuscitative interventions.

While the basic rationale for REBOA have not changed dramatically in the last 2 years, advances in techniques and the development of trauma-specific devices have simplified the conduct of this procedure and may serve to mitigate some of the inherent risks and access site complications associated with aortic occlusion. Specifically, the recent Food and Drug Administration's approval of the Prytime ER-REBOA catheter (Boerne, TX, USA) and the introduction of partial-REBOA (P-REBOA) approaches⁶ have likely improved the efficacy with which REBOA can be used to potentially salvage patients in extremis due to NCTH.

This video supplement will outline the approach used by the author to use REBOA in the clinical setting. All video elements outlining the steps used were obtained in either a cadaver or animal laboratory setting.

PROCEDURE AND TECHNIQUES

Patient Selection

Use of REBOA begins with patient selection. Although there is no randomized data to guide this choice, the work of Stannard et al.¹ provides a useful algorithm that continues to be useful in thought processes in this regard. In my practice, I consider using REBOA in any patient presenting with hypotension after trauma who proves to be a partial or nonresponder to

fluid challenge per Advanced Trauma Life Support guidelines. I undertake placement of the balloon in Zone 1 (distal thoracic aorta) for patients who meet these criteria and have a positive Focused Assessment with Sonography for Trauma examination result suggestive for intra-abdominal bleeding and in Zone 3 (immediately above the aortic bifurcation) for patients who have suspicion for pelvic source of NCTH.

There are also a number of contraindications to consider. Patients with widened mediastinum on initial plain film of the chest, which is a concern for blunt thoracic aortic injury should not undergo REBOA. Likewise, anyone with a penetrating thoracic injury or concern for bleeding above the potential balloon deployment site should not be subjected to this approach. Finally, patients with obvious c should be approached with caution, as there is concern that an elevated pressure occurring above the balloon after deployment may exacerbate intra-cranial hemorrhage. It is important to note, however, that the TBI group may also be among the most likely benefit from the restored cerebral perfusion pressure in the setting of concomitant shock.

Arterial Access

Although a variety of different techniques can be used to effectively establish the common femoral artery access required for REBOA, ultrasound guidance access should be considered the standard of care whenever it is feasible. The use of ultrasound affords precision of access placement, effectively identifies aberrant femoral anatomy, and mitigates the risk for potential arterial injury. It also greatly enhances the possibility of achieving access to "first stick" success in patients with severe hypotension or with no palpable pulse to guide needle insertion.

I use a 5 Fr Coda Micropuncture kit manufactured by Cook (Bloomington, Indiana, USA) for this purpose as shown in the video (Video, Supplemental Digital Content 1, <http://links.lww.com/TA/A921>). Once in place, this line can be used for monitoring and laboratory draws as needed if the patient responds to fluid challenge and does not require subsequent REBOA.

REBOA Device Selection and Appropriate Sheath Upsize

The choice of REBOA device to be used dictates subsequent upsizing of the 5 Fr sheath. Traditionally, the 32-mm Coda balloon was used (Cook). In my clinical practice, I no longer use this as my first-choice REBOA device, as Coda requires a large 12 Fr sheath and a lengthy semirigid wire for placement that proves cumbersome for use in the trauma setting. In addition, the absence of external marks on the balloon shaft requires the crude use of tape or other marking approaches to facilitate

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