

Commentary: Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA): Live More?

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This study aimed to investigate the effectiveness and feasibility of resuscitative endovascular balloon occlusion of the aorta (REBOA) by analyzing the clinical outcomes of REBOA in patients with traumatic shock [1]. Patient data were collected prospectively, and medical records were analyzed retrospectively. The authors performed REBOA in 96 traumatic shock patients and reported a procedural success rate of 97.9%. The overall survival rate was 32.6%. They concluded that REBOA is a feasible bridge therapy for traumatic shock patients.

I have a few comments.

First, as can be seen from the results of this study, it is very difficult to save patients with traumatic shock when cardiac arrest occurs. According to the Eastern Association for the Surgery of Trauma guidelines [2], the survival rate of blunt trauma patients without signs of life was as low as 0.7% even after resuscitative thoracotomy followed by aortic cross-clamping was performed. None of the survivors received cardiopulmonary resuscitation (CPR) in this study. Therefore, it is best not to be in a CPR situation. From the time of the injury to the time of entering the trauma bay, there may be several variables that we cannot intervene upon, but from the time of arrival at the hospital, we have to make prompt and accurate decisions to avoid cardiac arrest. To do so, the initial examination is of the

utmost importance. The mechanism of injury should also not be overlooked. At the time of the initial examination, the injured area should be predicted according to the vector of trauma in order to make accurate and faster progress. Maximal resuscitation should be performed to prevent cardiac arrest, and the procedure should be performed by a skilled physician in a fully supported hybrid trauma bay according to appropriate indications. I think that the timeline in the trauma bay of this study was actually quite good, but it is regrettable that the trauma bay was not equipped with real-time fluoroscopic guidance using C-arm or angiography.

Second, this study included many head trauma patients, and most head trauma patients present with hemorrhage (intracranial, subdural, epidural, and combined). Many patients (25/89, 28.1%) with severe brain injuries (Abbreviated Injury Scale >3, serious) were enrolled in this study. In general, patients with moderate head injuries (Abbreviated Injury Scale >2) associated with brain hemorrhage are more frequent in those injured through a blunt trauma mechanism. Previous case reports have alluded to the role of REBOA in possibly worsening traumatic brain injury (TBI) stability, as supraphysiologic proximal mean arterial pressure has been implicated in extending intracerebral hemorrhage [3]. In contrast, Johnson et al. [4] found that in

a hemorrhagic animal model also undergoing concomitant TBI, complete REBOA inflation was responsible for supra-physiologic SBPs and intra-cranial pressures, but did not create radiologic evidence of TBI progression [5]. Moreover, a recently published paper reported that there was no difference in in-hospital mortality according to the presence or absence of TBI in REBOA patients. This difference may be due to the duration of exposure to supraphysiologic pressures, in which longer periods of time may lead to worsening TBI [6].

Finally, the question readers are likely to be most curious about is whether REBOA has an advantage in the survival rate. However, in a single-center study, the sample size is limited, and even in a multi-center study, it would be difficult to evaluate REBOA results across multiple variables and hospital settings. Furthermore, current research pertaining to patient selection for REBOA continues to recommend its use as a last-ditch effort in patients with sustained shock despite receiving significant resuscitative measures [7]. Therefore, it is almost impossible to have a control group. For this reason, the strongest evidence supporting REBOA outcomes in civilian trauma stems from comparisons to other last-ditch efforts, such as resuscitative thoracotomy. Multiple investigations have found mortality benefits with REBOA compared with other open occlusion techniques [7-10].

The authors have reported several successful REBOA cases and are known to be working on educational programs and quality control. I look forward to their further research.

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