Q 13. REBOA PROVIDES A SAFE AND EFFECTIVE ALTERNATIVE TO EMERGENCY DEPARTMENT THORACOTOMY IN THE TIMES OF COVID-19

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Background: Emergency department thoracotomy (EDT) in patients with COVID19 adds substantial risk to the health care team. Previous studies comparing patient outcome following resuscitative endovascular balloon occlusion of the aorta (REBOA) versus EDT have lacked essential physiologic data at the time of intervention or appropriate controls. The AAST Aortic Occlusion for Resuscitation in Trauma and Acute Care Surgery (AORTA) registry is a large prospective multicenter (28 trauma centers) study that includes granular physiology data to compare the survival benefit of two aortic occlusion techniques (EDT and REBOA) in the acute resuscitation of critically injured patients.

Methods: We analyzed AORTA data from October 2013-January 2020 (level I=1036 patients; level II=31, 3%, patients). We excluded patients admitted to facilities where REBOA was not performed in the ED, and those in whom REBOA was converted to EDT (n=25, 68% mortality). Severe injury was defined as Abbreviated Injury Scale>2. We used Poisson regression with robust standard errors (to account for clustered data by hospital) to adjust the effect of AO type (EDT vs REBOA) on hospital mortality for all potential confounders with univariate $p < 0.25$ (age, sex, time to ED, hospital volume, mechanism, ISS, severe chest injury, severe traumatic brain injury[TBI], CPR and SBP upon AO initiation).

Results: Of 1067 patients, 802 (75%) underwent EDT and 265 (25%) REBOA. Crude mortality was 95% for EDT, and 64% for REBOA. There were no differences between the two groups regarding trauma center level and CPR duration. Compared to EDT patients, the REBOA group was older, more likely to be female, suffer blunt trauma, have longer transport times and less likely to have severe chest injuries. Most REBOAs (74%) were done in high-volume hospitals (> 4000/year), while hospital volume was not a factor in EDT frequency. After adjustment for the above confounders, EDT was associated with a 32% higher mortality risk than REBOA (Adjusted Relative Risk[RR]:1.32; 95% CI: 1.12-1.56). In a stratified analysis by mechanism and CPR, EDT was associated with a significantly higher mortality risk compared to REBOA in blunt trauma patients not requiring CPR upon AO (RR:2.26; 95% CI:1.81-2.84). EDT had a similar mortality risk as REBOA in blunt trauma undergoing CPR upon AO (RR:1.02; 95%CI:0.92-1.13), and in

penetrating trauma with or without undergoing CPR upon AO (RR:1.18;95%CI:0.89-1.57; RR:1.44;95%CI:0.33-6.27). The injury pattern significantly modified the mortality effect of EDT vs REBOA (interaction $p < 0.0001$) with EDT being associated with a significantly higher mortality than REBOA in isolated injury to the pelvis (RR: 4.70;95%CI:2.26-9.77), abdomen (RR:1.54;95%CI:1.16-2.03), and chest+abdomen (RR:1.43;95%CI:1.09-1.86). For injuries to abdomen+pelvis (RR: 1.54; 95%CI: 0.66-3.55), chest (RR:1.01;95%CI:0.87-1.18), chest+abdomen+pelvis (RR:1.39; 95%CI:1.00-1.94), chest+pelvis (RR:1.17;95%CI:0.79-1.73), EDT and REBOA had similar mortality risk.

Conclusion: Overall, and in all subgroups of injury and physiologic patterns, REBOA conferred a similar or better survival benefit compared to EDT. These findings suggest that in critically injured patients, without a suspected penetrating cardiac wound, REBOA is an effective alternative to EDT with the additional advantage of decreasing healthcare provider exposure during the COVID-19 pandemic.