Resuscitative Endovascular Balloon Occlusion of the Aorta Impact on Adult Trauma Patients with Pelvic Fractures Requiring Embolization

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Introduction

- Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) is an emergent procedure for the treatment of non-compressible torso hemorrhages (NCTH).
- Via a sheath placed in the common femoral artery (CFA), the REBOA catheter can be passed superiorly into the aorta where balloon occlusion of blood flow can occur.

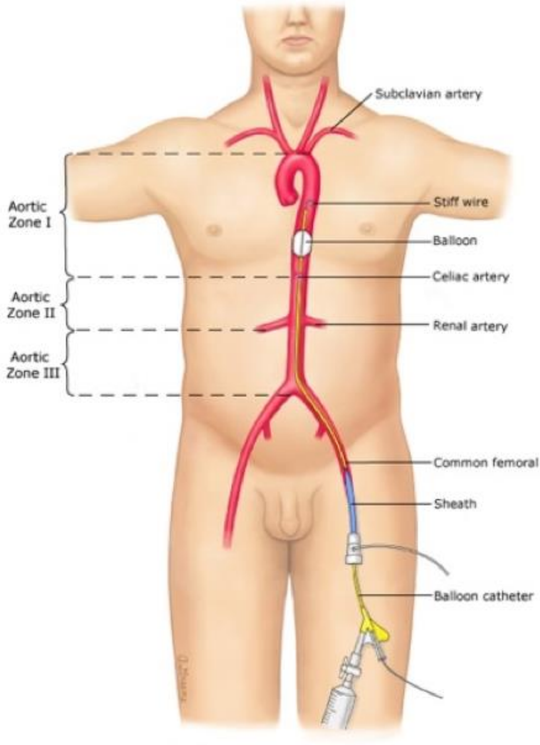

Figure 1. Visualization of REBOA deployment from CFA to Zone 1.[1]

Objectives & Methods

- The primary goal of this study was to determine the impact of REBOA on trauma patients with pelvic fractures requiring embolization.
- This retrospective study divided 120 patients treated since 2016 into PER (+REBOA, 21/120, 17.5%) and PE (-REBOA, 99/120, 82.5%).
- These groups were then compared based on:
  - Pre-Existing Conditions
  - Demographics
  - Injury Mechanism
  - ED Presentation
  - Injury Severity Score
  - Complications
- Univariate analyses (Chi-Square, Fisher's, and Equal Variance T-Test) were completed with significance indicated by $p<0.05$.

Results – ED Presentation

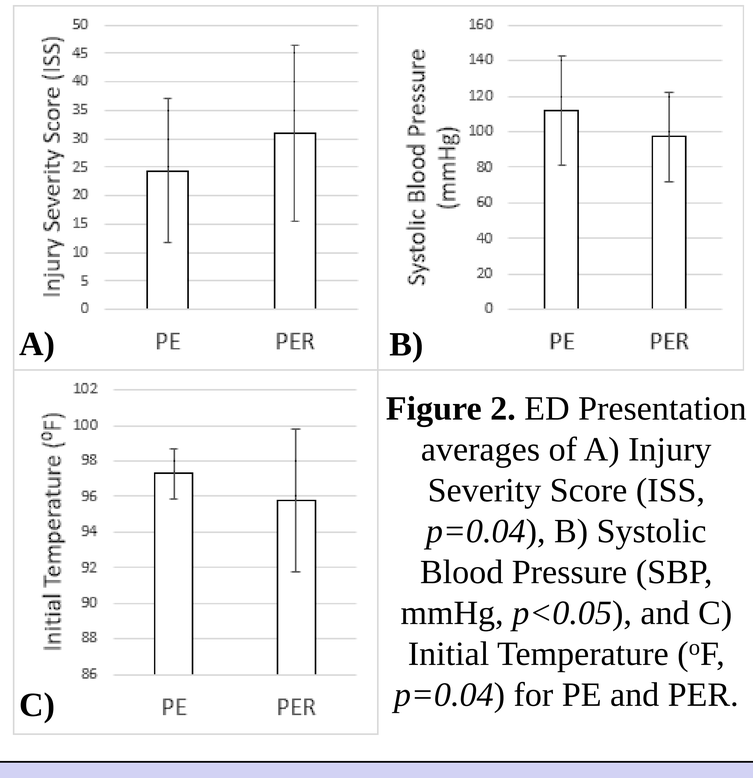

Figure 2. ED Presentation averages of A) Injury Severity Score (ISS, $p=0.04$), B) Systolic Blood Pressure (SBP, mmHg, $p<0.05$), and C) Initial Temperature (°F, $p=0.04$) for PE and PER.

Results – Outcomes

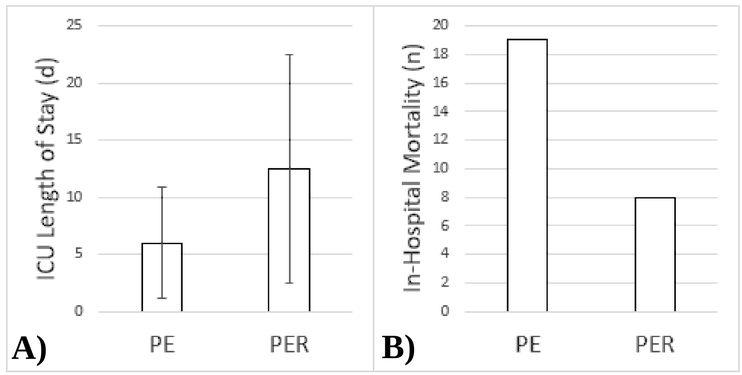

Figure 3. Average A) ICU Length of Stay (d, $p<0.001$) and B) In-Hospital Mortality (n, $p=0.08$) for patients in PE and PER. Mortality percentages are 19.2% and 38.1% for PE and PER, respectively.

Data Adjustment Criteria

Table 1. Door-to-Consult (DTC) and Door-to-Embolization (DTE) times (min) for PE and PER. *Adjusted for only patients with consults in the first six hours post-arrival.

	PE	PER
DTC, avg (SD)	501.2 (1576.9)	98.1 (69.9)
DTC*, avg (SD)	117.4 (63.6)	84.4 (31.5)
DTE, avg (SD)	671.1 (1756.7)	173.6 (73.1)
DTE*, avg (SD)	235.4 (150.1)	162.1 (51.8)

Results – Time to Treatment

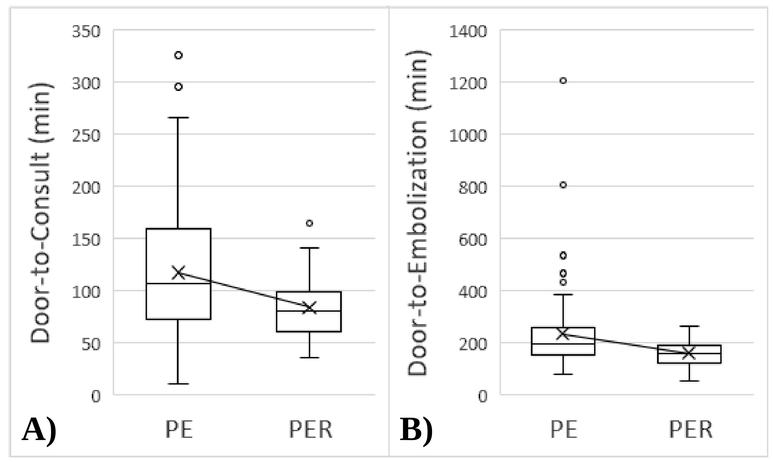

Figure 4. Box-and-Whicker Plots of Adjusted A) DTC ($p=0.03$) and B) DTE ($p=0.03$) for PE and PER. Adjustments removed 15 and 1 patient(s) from PE and PER, respectively.

Discussion

- REBOA deployment may be a helpful adjunct for patients presenting with pelvic fractures and hypotension.
- REBOA recipients presented in more critical condition, as seen with the increased ISS, decreased SBP, and decreased initial temperatures.
- REBOA recipients were significantly more likely to require exploratory laparotomies and received more PRBC's, indicative of the severity of their injury.
- There were no significant differences between PE and PER regarding mortality, amputation, thrombus formation, and ischemia.
- REBOA recipients showed a significant increase in acute kidney injury (AKI, $p=0.002$), which could be due to hemorrhage severity or deployment in Zone 3.
- REBOA may serve as a bridge to further treatment for patients by permitting rapid control of hemorrhage, evident by the decreased DTC and DTE.
- Use of REBOA in hypotensive trauma patients with pelvic fractures should be more widely considered.

References

1. Katz, Noam. "REBOA: Resuscitative Endovascular Balloon Occlusion of the Aorta." *EM Ottawa*, 23 Feb. 2017, emottawablog.com/2017/02/reboa-resuscitative-endovascular-balloon-occlusion-of-the-aorta/.