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

Introduction: Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) is an emergent procedure for the treatment of non-compressible torso hemorrhages (NCTH). The REBOA device is intended to be used as an adjunct to achieve hemostasis, only temporarily controlling blood flow. An embolization procedure, typically using Gel-Foam or coils, provides more definitive cessation of blood loss in hemorrhagic patients. The primary objective of this study was to compare the outcomes of adult trauma patients presenting with pelvic fractures requiring embolization who were treated with (PER) or without REBOA (PE).

Methods: A retrospective chart review of adult patients presenting to a Level 1 trauma center with pelvic fractures and subsequent embolization over a six-year period was conducted. These patients were then grouped based on REBOA recipient status. Demographic data, injury mechanism, and Injury Severity Score (ISS) were recorded. ED presentation statistics, as well as exploratory laparotomy (ex-lap) and embolization procedure metrics were collected. Complications including acute kidney injury (AKI), ischemia, thrombus formation, amputation, and mortality were recorded. Univariate analyses of corresponding data between PER and PE was performed with significance determined by $p<0.05$.

Results: One hundred twenty patients met study criteria for adult trauma patients with pelvic fractures and subsequent embolization. These patients were grouped into PER (21/120, 17.5%) and PE (99/120, 82.5%). The PER group presented to the ED with significantly higher ISS ($p=0.04$), lower SBP ($p<0.05$), and lower temperatures ($p=0.04$). PER required ex-laps at higher rates than PE (57.1% vs 25.3%, $p=0.008$). PER was also significantly more likely to require bilateral internal iliac artery (38.1% vs 14.1%, $p=0.02$) and right hepatic artery (14.3% vs 2.0%, $p=0.04$) embolization. When comparing patients with consults to IR in the first six hours post-arrival (104/120, 86.7%), PER showed significantly lower door-to-consult (DTC)($p=0.03$) and door-to-embolization (DTE) times ($p=0.03$) than PE. There was no significant difference in pre-existing conditions, complications, or mortality between groups, except AKI was found significantly more in PER ($p=0.002$).

Conclusion: This study demonstrated that REBOA may be a helpful adjunct for patients with hypotension and pelvic fractures. These patients presented with significantly higher ISS, requiring increased rates of ex-laps and embolization of large arteries perfusing the lower extremities. REBOA deployment served as a bridge to embolization by temporarily ceasing blood flow to these arteries while Trauma and IR mounted a rapid response, evident by lower DTC and DTE. Use of REBOA in patients with pelvic fractures and hemorrhage should be more widely considered given there is no significant change in mortality. Future studies should determine if the increase in AKI is due to hemorrhage severity or REBOA deployment in Zone 3.