

Whole blood administration during inflation of a Zone I resuscitative endovascular balloon occlusion of the aorta (REBOA); a 30 vs. 60 minutes comparison

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Background: Traumatic hemorrhage is the leading cause of death in civilian and military environments, with a mortality of 56% and 78% respectively. Efforts to stop non-compressible thoracic hemorrhage have resulted in the development of a resuscitative endovascular balloon occlusion of the aorta (REBOA). REBOA is an alternative to resuscitative thoracotomy for treatment of hemorrhagic shock. Little is known about the cardiovascular effects of simultaneous whole blood (WB) administration and REBOA following hemorrhagic shock. Information about the feasibility of this resuscitation strategy would be invaluable in en route scenarios where damage control resuscitation needs to be initiated immediately. We hypothesized that administration of WB during REBOA, will maintain a normal blood pressure and increase survival after balloon deflation.

Materials and Methods: Six swine (*Sus scrofa*) were used in a 40% controlled hemorrhage protocol. Ten minutes after completion of hemorrhage, subjects were randomized to have a Zone I REBOA balloon inflated for either 30 or 60 minutes. Fifteen minutes after balloon inflation, subjects received either one or three units of WB via the internal jugular over 5 minutes per unit. Balloon placement was confirmed by fluoroscopy. Observation period following balloon deflation was 120 minutes. Physiological parameters, blood gas analysis and chemistries were collected during the experiment.

Results: In the 30 minute cohort, 4/4 subjects survived the entire observation period post REBOA deflation, with 2 subjects receiving one unit, and 2 subjects receiving three units of WB. However, in the 60 minute REBOA cohort, 2/2 subjects died with an average of 3 minutes following balloon deflation.

Conclusion/Discussion: Administration of WB during 30 minute REBOA is a viable resuscitation approach; however, administration of WB during 60 minute REBOA does not prevent death after balloon deflation.

Disclaimers: *The views expressed are those of the author and do not reflect the official views or policy of the Department of Defense or its Components.*

The experiments reported herein were conducted according to the principles set forth in the National Institute of Health Publication No. 80-23, Guide for the Care and Use of Laboratory Animals and the Animal Welfare Act of 1966, as amended.