

Porcine Model of Trauma with Non-compressible Hemorrhage for Pre-hospital Survival Studies

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Background. The lack of a well standardized animal model of trauma with hemorrhagic shock focused on pre-hospital survivability and morbidity is a major capability gap to test efficacy of new pharmacotherapeutic approaches of severe battlefield casualties.

Methods. Pre-pubertal Yorkshire crossbred swine were subjected to instrumented without hemorrhage (Sham, n=3), controlled hemorrhage (31%), 30-minute shock period, splenic injury (H+Spl, n=12), and H+Spl with Voluven resuscitation at 15ml/kg after 30min of spleen injury (H+Spl+Voluven, n=5). Systemic complement activation, cytokine, and blood gas analysis, as well as physiological and morphological changes were examined.

Results. The mean survival was 113 minutes in the H+Spl group, whereas Voluven resuscitation prolonged animal survival (mean survival 257 minutes; Figure 1). Blood level of C3a, IL-6 and lactate increased in the H+Spl group, whereas Voluven resuscitation decreased C3a and lactate levels (Figure 2), but no improvement on IL-6 and tissue injury was observed.

Conclusions. This porcine hemorrhagic shock model is suitable for the evaluation of early administration of pharmaco-biologic new small-volume therapeutic intervention aimed at prolonging survival during delayed evacuation.

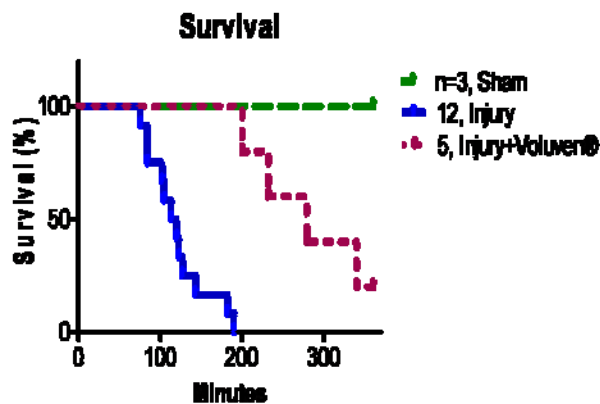


Figure 1. This model without fluid resuscitation leads to high mortality

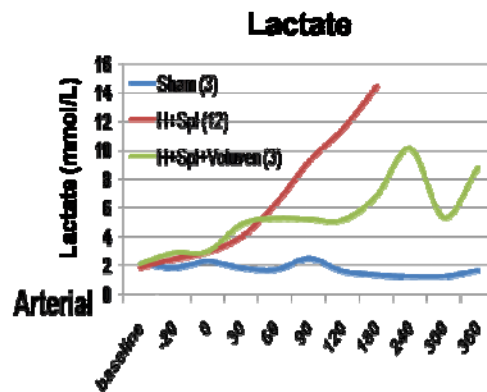


Figure 2. The controlled hemorrhage and splenic injury increases blood levels of lactate