The effects of hemorrhagic shock and resuscitation on intra-abdominal pressure

O. Yoshino,[1] A. Quail[2] and Z. Balogh,[1] [1]Department of Traumatology, John Hunter Hospital and University of Newcastle, and [2]Discipline of Human Physiology, School of Biomedical Science and Pharmacy, Faculty of Health, University of Newcastle, Callaghan, NSW 2308, Australia.

Elevated intra-abdominal pressure (IAP) produces detrimental effects on abdominal organs in abdominal compartment syndrome (ACS). It is postulated that severe ischemia and reperfusion injury may be the main cause of increased IAP and ACS. The aims were to quantitate the effect of haemorrhagic shock, resuscitation (including timing of blood transfusion) on IAP. Three groups of 6 rabbits were anaesthetised (isoflurane) and instrumented with central venous, peritoneal and arterial catheters. Arterial blood gases, blood pressure, heart rate, central venous pressure and IAP were monitored. Group 1 served as a sham without haemorrhagic shock. Group 2 and 3 were bled to induce haemorrhagic shock (mean arterial pressure maintained at ~30 mmHg for 1 hour), followed by resuscitation over 5 hours with Lactated Ringer and early (immediate) return of shed blood in Group 2; and with Lactated Ringer and delayed (after 180 minutes) return of shed blood in Group 3. Physiological parameters were unchanged in the sham group, while Group 2 and 3 were successfully resuscitated following severe haemorrhagic shock based on vital signs and blood gases. IAP in Group 1 was stable at 0.9±0.16 mmHg (mean±SE), whereas Group 2 and 3 had significant increases in IAP to 3.1±0.38 mmHg ($P < 0.05$) and 3.8±0.34 mmHg ($P < 0.05$) respectively at 5 hours. IAP increased significantly after 240 and 150 min in Group 2 and 3 respectively. It is concluded that haemorrhagic shock and subsequent resuscitation increased IAP in the rabbit to a maximum 4 mmHg. Early resuscitation with blood transfusion potentially alleviated the effect of haemorrhagic shock on IAP.