Excessive pressure within the peritoneal cavity, known as intra-abdominal hypertension (IAH), can adversely affect not only intra-peritoneal organ function, but also other organ systems throughout the body. When IAH > 20 mmHg induces new organ dysfunction, a potentially lethal condition known as the abdominal compartment syndrome (ACS) is defined. Practically, this syndrome can be considered multi-system organ failure occurring from severe IAH. While the physical effects of IAH/ACS are increasingly being described, the humoral ones, related to IAH-induced ischemia are poorly understood. Recent animal work suggests that aggressively removing intra-peritoneal fluids, assumed to be vasoactive mediator-rich, leads to better systemic outcomes. There is no human data to support this however. Previous attempts at peritoneal drainage in inflammatory conditions such as sepsis and pancreatitis where not conclusive, but this may have been due to the inefficiency of the systems used and the lack of attention to IAH. Recently, efficient systems providing a temporary abdominal closure (TAC) to both drain intra-peritoneal fluids and to control IAH have been introduced. One of these dressing systems, known as the KCI AbThera™ Abdominal Dressing is currently approved for use in Canada as a temporary abdominal closure (TAC) device but its role in ameliorating systemic sepsis/SIRS has not been evaluated.

We propose a randomized trial of using either the "home Calgary Stampede Vac"* involving wall suction or the KCI AbThera™ Abdominal Dressing, to dress the abdomen whenever the operative surgeon determines that an open abdomen is warranted to treat the patient.

Inclusion Criteria**:** Any post-operative laparotomy patient in whom the operative surgeon has determined that the patient will be best served by utilizing a TAC, for whatever reason including but not limited to, overt or potential IAH/ACS, abdominal wall loss, need for future reoperation, and/or purposeful placement of sponges or other foreign bodies.

Exclusion Criteria**:** Any post laparotomy patient with a primary fascial closure and no need for a TAC.

Measurements and Outcomes: Intra-peritoneal and plasma inflammatory mediators will be measured on a treatment allocation basis immediately after initiation of the TAC, and thereafter at 2, 3, 7 and 28 days. The mediators studied will include, but are not limited to TNF-α, IL-1β, IL-6, IL-10, IL-12, and CRP. The chemotactic potential of immune cells present in the peritoneal fluid will be assessed using under agarose assay while the capacity of the peritoneal fluid to activate the endothelium and/or the neutrophils will be measured by flow-chamber techniques. Other standard indices of critical care will also be collected and compared including, APACHE II scores, Intensive Care Unit (ICU) and hospital outcomes, incidence of new organ failure, requirements for ventilatory, renal replacement, and vasopressor support will be studied at 30 days and/or hospital discharge on an intention to treat basis. Forty patients will be recruited over 2 years.