

Remote organ injury after traumatic surgery

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Each year, over 300 million major surgical procedures are performed, representing an increase almost 40% over the previous eight years. Despite this, our current understanding of the long-term organ functions of surgical trauma remains limited. Post-surgical inflammation is a documented phenomenon that results in the long-term impact of post-operative inflammation on vital organ function may be enormous. Indeed, an uninhibited early inflammatory response results in a well-documented disorder known as Systemic Inflammatory Response Syndrome (SIRS). Studies have shown that higher surgical stress is reflected by SIRS and correlates with longer hospital stay, and that many patients undergoing major surgeries develop postoperative SIRS. There are thought to be five general mechanisms behind the development of multi-organ dysfunction following SIRS. Firstly, SIRS has a profound vasodilatory effect that results in abnormal distribution of circulating volume and subsequent tissue hypoperfusion. Secondly, the increased vascular permeability leads to the displacement of fluids into the interstitial space and subsequent parenchymal oedema. The third contributory factor is disseminated intravascular coagulation, which occurs to the combination of endothelial damage, increased expression of cell adhesion molecules and small thrombi in the microcirculation. Fourthly, neutrophils are responsible for the production of reactive oxygen species (ROS) and proteases, which result in oxidative damage and contribute to endothelial dysfunction. Finally, activation of inducible nitric oxide synthase (iNOS) results in increased production of NO, which, in turn, contributes to further inflammation. In addition, NO has the ability to react with superoxide, leading to cell toxicity due to peroxynitrate formation. My lecture aims to highlight our current understanding of the pathogenesis underlying the development of post-surgical inflammation and subsequent organ damage, including post-operative cognitive dysfunction and delirium.