Trauma preconditioning of cytokine response: comparison of perioperative cytokine profiles in elective cardiac versus orthopaedic trauma surgery patients

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Acute kidney injury (AKI) is a sudden decline in kidney function that poses a significant risk to patients undergoing surgery. Those who develop AKI face higher morbidity and mortality rates, extended hospital stays, and an increased risk of progressing to chronic kidney disease. Previously, we recruited two distinct patient cohorts, one undergoing elective cardiac surgery and one undergoing orthopaedic fracture surgery to investigate biomarkers involved in the pathophysiology of AKI. This study is a retrospective analysis of data from the two surgical cohorts to examine if there are any similarities between cytokine responses. Methods : Pre- and post-operative blood and urine biomarker data from elective cardiac surgery patients (n=401) and orthopaedic fracture surgery patients (n=237) were analysed to compare baseline, ratio, and delta change differences. Results: Pre-operatively, baseline levels of most biomarkers were significantly higher in orthopaedic fracture patients compared to elective cardiac surgery patients. Post-operatively, most biomarker levels remained significantly higher in orthopaedic fracture surgery patients with the exception of urinary anti-inflammatory biomarkers which were higher in cardiac patients. Preoperatively, renally favourable biomarker ratios were significantly higher in orthopaedic fracture surgery patients compared to elective cardiac surgery patients. In contrast, post operatively, renally favourable biomarker ratios were significantly higher in elective cardiac surgery patients. The delta differences between pre- and post-operative biomarker levels were generally higher in the elective cardiac surgery patients compared with orthopaedic fracture surgery patients. Discussion : In this study, in patients which have experienced a fracture, the trauma of the initial injury activated their pro- and anti-inflammatory cytokine responses such that renally favourable ratios prevailed pre-operatively. The further pro-inflammatory response from fracture repair (during surgery) was compensated by an already established anti-inflammatory perioperative response, suggesting that post-operative compensatory anti-inflammatory responses do not need to be of the same magnitude compared to a non-preconditioned (e.g. elective cardiac) response.