

Arginase activity and CD3f expression after major surgery

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Dear Editor,

Major surgery suppresses cellular immunity for several days. However, the mechanisms underlying T cell dysfunction remain incompletely understood. Among other abnormalities, T cell dysfunction after surgery or trauma includes reduced cell surface T cell receptor (TCR) and diminished T lymphocyte proliferation response. Because a decreased arginine level may inhibit T cell function leading to increased susceptibility to infection after injury, catabolism of arginine by arginase I, an enzyme highly expressed in human neutrophils, might be an important mechanism by which arginine availability could become limited after major surgery. Reduced CD3f expression also hampers cytoplasmic signaling in activating T cells. In this regard, we examined the temporal patterns of CD3f expression and arginase activity in patients undergoing major surgery, following a prospective, single-center observational study with 50 patients scheduled for major colorectal surgery. The protocol was approved by the Salamanca University Hospital Medical Ethics Committee, performed in accordance with the Declaration of Helsinki, and written consent was obtained from all patients included in the study. Table 1 shows the time course of distinct parameters measured in the blood of patients after undergoing colorectal cancer surgery in an attempt to identify a correlation between the levels of CD3f expression, assessed by Western blot analysis following electrophoresis of equally loaded samples of isolated peripheral blood lymphocytes in each gel electrophoresis lane, and arginase activity, measured in the patient sera as previously described. Data corresponding to CD3f expression, arginase activity, total and differential (neutrophils, lymphocytes) leukocyte count, platelet count, and fibrinogen level were determined in samples collected 24 h before preparation of the patient for surgery (day 0), as well as 24 h (day 1), 48 h (day 2), and 72 h (day 3) after surgery. As shown in Table 1, we found a significant increase in arginase activity between preoperative and 24, 48, and 72 h following surgery that was concomitant with a significant decrease in CD3f expression between preoperative and 24, 48 and 72 h. We found a negative linear correlation between the levels of arginase activity and CD3f expression in the first 24 h post-surgery ($r = -0.796$; $p = 0.003$), whereas the neutrophil count was significantly increased after surgery. To our knowledge this is the first study that shows a correlation between arginase activity and CD3f level following major surgery. These results may suggest that the increase in arginase activity levels, likely from an increase in neutrophil count, detected 24 h after surgery might reflect a physiological anti-inflammatory response trying to limit immune system-mediated organ damage as a consequence of the systemic inflammatory response secondary to surgery. In this regard, it is tempting to suggest that systemic inflammatory response after surgery could be accompanied by an anti-inflammatory process in which arginase could play a major role. Further studies should be performed to establish causality between the above data in an attempt to provide a meaningful and statistically valid connection and causal relationship between arginase activity increase and CD3f loss to prevent excessive inflammatory response and as a putative mediator of septic complications after surgery.