RED BLOOD CELL STORAGE DURATION AND MORTALITY IN PATIENTS UNDERGOING PERCUTANEOUS CORONARY INTERVENTION

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BACKGROUND: Blood transfusion has been associated with an increased mortality in patients undergoing percutaneous coronary intervention (PCI). Although the reasons for this remain unclear, it may be related to the structural and functional changes occurring within red blood cells (RBCs) during storage. We investigated whether RBC storage duration was associated with mortality in patients requiring transfusion after PCI. METHODS: We collected data on all RBC transfusions occurring within 10 days of PCI (excluding those related to cardiac surgery) using the British Columbia Cardiac Registry and Central Transfusion Registry. Transfusion details were analyzed according to 30-day survival. RESULTS: From a total of 32,580 patients undergoing PCI, 909 (2.8%) patients received RBCs with a mean storage duration of 25 +/- 10 days. In these 909 patients, mean transfusion volumes were lower in survivors (2.8 +/- 2.1 vs 3.8 +/- 2.9 U, P = .002) than those who died within 30 days. In a multivariate analysis to adjust for baseline risk, mean RBC storage age (HR 1.02 [95% CI 1.01-1.04], P = .002) and transfusion volume (HR 1.26 [95% CI 1.18-1.34], P < .001) both predicted 30-day mortality. Transfused patients who received only older blood (RBC min age >28 days) appeared to be at greater risk of death (HR 2.49 [95% CI 1.45-4.25], P = .001). CONCLUSION: Red blood cell transfusion is associated with increased 30-day mortality in patients undergoing PCI. Although current transfusion practice permits RBC storage for up to 42 days, the use of older red cells may pose an additional hazard to this patient group. **[Am Heart J. 2010; 159(5):876-81]**

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NATURAL HISTORY OF EXPERIMENTAL CORONARY ATHEROSCLEROSIS AND VASCULAR REMODELING IN RELATION TO ENDOTHELIAL SHEAR STRESS. A SERIAL, IN VIVO INTRAVASCULAR ULTRASOUND STUDY.

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BACKGROUND: -The natural history of heterogeneous atherosclerotic plaques and the role of local hemodynamic factors throughout their development are unknown. We performed a serial study to assess the role of endothelial shear stress (ESS) and vascular remodeling in the natural history of coronary atherosclerosis. Methods and Results-Intravascular ultrasound-based 3-dimensional reconstruction of all major coronary arteries (n=15) was performed serially *in vivo* in 5 swine 4, 11, 16, 23, and 36 weeks after induction of diabetes mellitus and hyperlipidemia. The reconstructed arteries were divided into 3-mm-long segments (n=304). ESS was calculated in all segments at all time points through the use of computational fluid dynamics. Vascular remodeling was assessed at each time point in all segments containing significant plaque, defined as maximal intima-media thickness >/=0.5 mm, at week 36 (n=220). Plaque started to develop at week 11 and progressively advanced toward heterogeneous, multifocal lesions at all subsequent time points. Low ESS promoted the initiation and subsequent progression of plaques. The local remodeling response changed substantially over time and determined future plaque evolution. Excessive expansive remodeling developed in regions of very low ESS, further exacerbated the low ESS, and was associated with the most marked plaque progression. The combined assessment of ESS, remodeling, and plaque severity enabled the early identification of plaques that evolved to high-risk lesions at week 36. Conclusions-The synergistic effect of local ESS and the remodeling response to plaque formation determine the natural history of individual lesions. Combined *in vivo* assessment of ESS and remodeling may predict the focal formation of high-risk coronary plaque. **[Circulation, 2010;121 (19):2092-101]**

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EVALUATION OF SUBLINGUAL AND GUT MUCOSAL MICROCIRCULATION IN SEPSIS: A QUANTITATIVE ANALYSIS

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OBJECTIVE: To determine the relationship between sublingual and intestinal mucosal microcirculatory perfusion. DESIGN: Observational, experimental study. SETTING: University-affiliated large animal laboratory. SUBJECTS: Ten fasted, anesthetized, mechanically ventilated, male pigs randomized to a sham group (n = 3) or to a hyperdynamic septic shock group (n = 7) in which cholangitis was induced by direct infusion of Escherichia coli into the common bile duct. This model was developed because it is not accompanied by changes in intra-abdominal pressure. MEASUREMENTS AND MAIN RESULTS: The sublingual and intestinal microcirculations were simultaneously assessed at 4-hr intervals for up to 12 hrs with a modified orthogonal polarization spectral device and functional microvessel density and erythrocyte velocity were measured quantitatively. In sham animals, both regions maintained a stable functional microvessel density and erythrocyte velocity throughout the study period. In contrast, in septic animals, already after 4 hrs of sepsis, functional microvessel density was markedly decreased (>50%) in the sublingual and gut regions; mean erythrocyte velocity decreased dramatically and similarly in both regions, from 1022 +/- 80 to 265 +/- 43 mum/sec in the sublingual region and from 1068 +/- 45 to 243 +/- 115 mum/sec in the gut ($p < 0.001$, at T12). There was a significant correlation between the sublingual and gut microcirculations in septic animals ($r = 0.92$, $p < 0.0001$). CONCLUSIONS: The severity and the time course of microcirculatory changes were similar in the sublingual and in the gut region in this clinically relevant model of severe sepsis. These findings support the sublingual region as an appropriate region to monitor the microcirculation in sepsis. **[Crit Care Med. 2009; 37(11):2875-81]**

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