TITLE: RISK FACTORS FOR MULTISYSTEM ORGAN FAILURE AFTER CARDIAC SURGERY

AUTHORS: K. Tuman,M.D., R. McCarthy,Pharm.D., E. Corey, R.N., A. Ivankovich,M.D.

AFFILIATION: Anes. Dept., Rush Medical College, Chicago, Illinois 60612

Although the etiology of multisystem organ failure (MSOF) after cardiac surgery is often related to events occurring during cardiopulmonary bypass (CPB), little is known about which, if any, preoperative factors increase the risk of MSOF or worsen its prognosis. In view of the high mortality and increased costs associated with MSOF after otherwise successful surgery, we sought to determine which preoperative factors identify patients at increased risk for these complications. After institutional approval, 2813 consecutive adults undergoing operations with CPB were prospectively studied over a 45 mo period. MSOF was defined as failure of 3 or more of 4 designated organ systems: cardiovascular, pulmonary, renal, neurologic, or development of sepsis syndrome. Univariate analysis revealed a significant association of advanced age, prolonged CPB time, female gender, CHF, pulmonary hypertension, preop renal dis, dysrhythmias, endocarditis, preop cerebral dis, and diabetes with the occurrence of MSOF (n=84). There was no difference in the incidence of unstable angina, COPD, recent MI, reoperation, emergency surgery, or use of normothermia during CPB among those with and without MSOF. A set of 8 variables was found by fitting a stepwise logistic regression model (LRM) with all the variables to see which were important predictors. The LRM identified, in descending order of importance, the following factors as useful in predicting MSOF: advanced age, preop renal dis, prolonged CPB time, recent MI (< 3 months), operation other than CABG, female gender, endocarditis, and preop cerebral dis. In a separate LRM, the association of prolonged CPB time with MSOF was adjusted for the presence of normothermia during CPB (n=359), without changing the above findings. LRM and univariate analysis failed to find an association of volatile or intravenous anesthetic agent or use of a PA catheter before arrival in the ICU with development of MSOF. Inhospital death was influenced more by number of and less by specific organ systems involved.

MORTALITY AFTER MSOF

System Involved:	C	R	P	N	S
# Organ systems	*# of patients / % mortality*				
3 (n=51)	27/41	26/54	48/46	23/48	29/48
≥4 (n=33)	28/79	31/81	33/79	19/74	26/81
overall (n=84)	55/60	57/68	81/59	42/60	55/64

C=cardiac, R=renal, P=pulm, N=neuro, S=sepsis syndrome

Another LRM was developed to identify factors associated with in-hospital death after MSOF occurred. This LRM allowed prediction of death due to MSOF with 84% accuracy based on the presence of only 2 preop factors: advanced age and CHF. MSOF after cardiac surgery remains a devastating complication associated with a high mortality rate. We have identified preop markers of increased risk for MSOF which also allow more accurate prognoses after MSOF occurs. Use of such prognostic factors may become increasingly important, influencing decisions regarding the use of resources and funds in certain subsets of patients who develop MSOF after cardiac surgery.