

ASPIRIN PROPHYLAXIS AGAINST THROMBOEMBOLIC DISEASE. W. H. Harris. Orthopaedic Research Lab., Massachusetts General Hospital, Boston, MA.

The efficacy and safety of aspirin prophylaxis in preventing deep vein thrombosis is now scientifically established. This was done in a prospective, randomized, simultaneously controlled, double-blind placebo study using objective diagnostic methods in 98 patients over age 40 years undergoing total hip replacement surgery. All patients had fibrinogen uptake tests, cuff impedance phlebography, and radiographic phlebography. The one patient with postoperative pulmonary signs or symptoms had Q/V pulmonary scans and selective pulmonary angiography. Twenty-three of fifty-one patients in the control group developed thromboembolic disease, compared to eleven of forty-seven in the aspirin group ($P < 0.02$, Fisher Exact Test). The embolus occurred in the control group. There were no deaths. Aspirin was given as 1.2 grams daily starting preoperatively.

To study the efficacy of this prophylaxis without the use of early surveillance diagnostic methods, four hundred ninety-eight consecutive patients over 40 years of age undergoing total hip replacement had aspirin prophylaxis but only clinical diagnosis was used. No fatal pulmonary emboli occurred. The only fatality was shown at postmortem not to be caused by an embolus. All patients with pulmonary signs or symptoms had perfusion pulmonary scans. Only seven patients had objectively demonstrated, nonfatal, pulmonary emboli (1.4%).

A BLEEDING DIATHESIS ASSOCIATED WITH A PLATELET STORAGE POOL DEFICIENCY ACQUIRED DURING CARDIOPULMONARY BYPASS SURGERY. C.B. Harbury and C.A. Galvan. Stanford University School of Medicine.

The main purpose of this study was to assess whether patients undergoing cardiopulmonary bypass surgery (CPBS) acquire a temporary platelet storage pool deficiency (PSPD). Pre- and postoperative total and releasable platelet ADP and ATP were measured. The luciferase assay for ATP was used (Holmsen). Platelets were counted and sized using a Coulter H3 system. Bleeding was assessed by chest tube drainage (CTD), cc per 6 hours. Sixty-six patients were studied. None received platelet transfusion. There was a significant decrease in total and releasable ADP and ATP, paired t test $p < 0.001$ in each case. Pre vs postoperative releasable ADP in nanomoles/ 10^8 platelets: 2.15 to 1.51, ATP: 1.38 to 1.0, total ADP: 3 to 2.5, total ATP: 5.5 to 4.9. Mean platelet volume pre- vs postoperatively was not significantly different (paired t test) CTD above 400 cc was significantly correlated with PSPD of 0.5 nm or more decrease in releasable ADP ($X^2=5.79$, $p < 0.02$). If patients with platelet counts below 100,000 are included in platelet injury group, $X^2=8.2$, $p < 0.01$. A decrease of $1 \text{ nm}/10^3$ platelets or more of releasable ADP was significantly correlated with duration of CPB. If bypasses above and below 90 minutes are compared, $X^2=7.97$, $p < 0.01$, above and below 105 minutes $X^2=9.05$, $p < 0.01$. There is a significant drop in platelet count during bypass surgery, but there is no significant change in platelet size. Thus, a large granule rich platelet population was not removed. Acquisition of a platelet storage pool deficiency was significantly associated with a bleeding diathesis postoperatively. The acquisition of a platelet storage pool deficiency was significantly associated with duration of cardiopulmonary bypass.

ANTICOAGULATION IN CARDIOPULMONARY BYPASS. C. Thomas Kisker, John A. Young, Donald B. Doty, Barbara J. Taylor. University of Iowa College of Medicine, Departments of Pediatrics and Surgery, Iowa City, Iowa, U.S.A.

Prolonging the activated clotting time (ACT) 2 to 3 times normal is said to provide a "safe" level of anticoagulation during cardiopulmonary bypass. To test this level of anticoagulation 9 monkeys were anticoagulated with heparin at the start of cardiopulmonary bypass so that ACT's ranged from 201 sec to > 1000 sec (normal 91 sec). ACT, platelet count (P), fibrinogen (F), and fibrin monomer (FM) were measured at 10, 30, 60, 90, and 120 minutes during bypass. Antithrombin III (AT3) was measured before and after bypass. Six monkeys developed increased FM indicating active coagulation beginning from 10 to 60 minutes on bypass. ACT's were > 200 sec in all animals at the time of FM detection. P fell below $100,000/\text{mm}^3$ in the 6 animals with elevated FM, but remained above $100,000/\text{mm}^3$ in the other 3 animals. The mean value of AT3 (69%) decreased to 24.4% after bypass in the 6 animals with elevated FM, but was 61% after bypass in the others. Scanning electron microscopy of the oxygenator membranes showed significant amounts of fibrin on the membranes used in monkeys who developed increased FM levels, but not on those with normal FM concentrations. F decreased from 167 mgm/dl to 80.5 mgm/dl in monkeys with elevated FM and to 117 mgm/dl in those with normal FM concentrations. Excessive bleeding did not occur in the animals without increased FM although ACT's were in excess of 1000 sec. Subsequently three human subjects on cardiopulmonary bypass whose ACT's were maintained above 400 sec have not shown increased FM levels. The results suggest that prolonging the ACT more than 2 - 3 times normal is required to prevent activation of clotting during cardiopulmonary bypass.