

**0037**

08:45 h

CLINICAL AND LABORATORY VARIABLES IN PREDICTION OF VENOUS THROMBOSIS AFTER ELECTIVE GASTRO-INTESTINAL SURGERY. G.D.O. Lowe, B.M. McArdle, D.H. Osborne, A. Smith, J.J.F. Belch, D.C. Carter, C.D. Forbes and C.R.W. Prentice. University Departments of Medicine and Surgery, Royal Infirmary Glasgow, Scotland.

Thirty-two clinical and laboratory variables were measured in 63 patients prior to elective major gastro-intestinal surgery, who were screened for deep vein thrombosis (DVT) using the  $^{125}\text{I}$ -fibrinogen uptake test. Twenty-one patients (33%) developed DVT in the six days following surgery. Five clinical variables were significantly associated with subsequent DVT - age, per cent overweight, varicose veins, female sex (all positive risk) and cigarette-smoking (negative risk). Using clinical variables a high-risk group (> 60% DVT) could be separated from a low-risk group (< 10% DVT). None of 20 laboratory variables was significantly associated with DVT, but several (fibrinogen, factor VIII, plasma viscosity, blood viscosity, and serum fibrin degradation products) were associated with malignancy, infection or jaundice, which limits their usefulness in prediction of DVT in this group of patients. An incidental finding, that postoperative fall in haemoglobin was associated with DVT, suggests that bleeding or haemodilution may promote thrombosis. The clinical index requires validation in a prospective study, but may have practical value in selection of high-risk groups for selective prophylaxis or research studies, particularly in view of its simplicity.

**0039**

09:15 h

HYPERCOAGULATION AND THE PREDICTABILITY OF THROMBOEMBOLIC PHENOMENA IN TOTAL HIP AND TOTAL KNEE SURGERY. K. Kurica, J. Holmes, S. Peck, B. Cox, C. Brantigan, W. Wenzel. Departments of Orthopedic Surgery, General Surgery, Pathology and Radiology, Presbyterian Medical Center, Denver, Co. USA

Forty patients admitted for elective total hip and total knee surgery were evaluated to determine the efficacy of the hypercoagulable profile in the predictability of high and low risk patients for the development of thromboembolic phenomena (proximal deep vein thrombosis and pulmonary embolism) after surgery. Patients were evaluated pre operatively with  $^{99\text{m}}\text{Tc}$  MAA venograms, ventilation perfusion lung scans, pneumatic plethysmography and a hypercoagulable profile including: thrombin generation test, plasma clot impedance test, antithrombin III. Patients with evidence of thromboembolic phenomena by  $^{99\text{m}}\text{Tc}$  scans or positive plethysmography were excluded. The hypercoagulable profile was repeated on the first post operative day. Both the hypercoagulable profile and the  $^{99\text{m}}\text{Tc}$  scans were repeated on the tenth post operative day or if the patient developed any signs or symptoms of thromboembolic phenomena. There was no prophylaxis given.

Ten patients were hypercoagulable pre operatively; four developed post operative thromboembolic phenomena. Nine patients became hypercoagulable post operatively; three patients developed thromboembolic phenomena as determined by  $^{99\text{m}}\text{Tc}$  criteria. The remaining nineteen patients were never hypercoagulable throughout their hospital course and were discharged without evidence of thromboembolic phenomena by  $^{99\text{m}}\text{Tc}$  imaging criteria.

The hypercoagulable screen successfully separates those patients at high and low risks for the development of post operative thromboembolic phenomena after total hip and knee surgery. These results are statistically significant to the one tail  $p < 0.0001$  level using Fisher's exact test.

**0038**

09:00 h

THE BALANCE BETWEEN THROMBIN AND PLASMIN ACTION ON FIBRINOGEN AND THE OCCURRENCE OF VENOUS THROMBOSIS. J. Owen, D. Kvam, H.L. Nossel, K.L. Kaplan. Departments of Medicine and Neurosurgery, Columbia University College of Physicians and Surgeons, New York, NY, U.S.A.

We have studied activation of coagulation, fibrinolysis and platelets in association with venous thrombosis in patients undergoing craniotomy. Serial  $^{125}\text{I}$ -fibrinogen leg scans were used to detect the presence or onset of venous thrombosis and were confirmed by venography when positive. Serial measurements were made of plasma levels of fibrinopeptide A (FPA), thrombin-increasable fibrinopeptide B (TIFPB), platelet factor 4 (PF4) and beta thromboglobulin ( $\beta\text{TG}$ ) as indices of thrombin or plasmin proteolysis of fibrinogen and of platelet  $\alpha$ -granule release respectively. 17 patients had positive leg scans and 14 had negative leg scans. In normal individuals the FPA level is less than the TIFPB level with a ratio of FPA to TIFPB which is less than 0.5. In 16 of 17 patients with thrombosis FPA levels were elevated and the FPA:TIFPB ratio was markedly increased immediately preceding and overlapping the change of leg scan from negative to positive or with the initial detection of a positive leg scan. In 9 patients the time of onset of thrombosis was documented by the change of the leg scan from negative to positive. In 8 of these patients the FPA level rose and exceeded the TIFPB level preceding and/or overlapping the change in the leg scan. Similar changes in FPA and TIFPB were present in the other 8 patients but since the initial leg scan was positive the time of onset of thrombosis could not be documented. Prior to thrombosis  $\beta\text{TG}$  but not PF4 levels were elevated. The marked changes in the FPA/TIFPB ratio prior to thrombosis exhibited a significant positive predictive value for thrombosis. The data document a close association between venous thrombosis and imbalance between thrombin and plasmin action on fibrinogen as reflected by plasma levels of FPA and TIFPB.

**0040**

09:45 h

DECLINING MORTALITY FROM PULMONARY EMBOLISM IN SURGICAL PATIENTS. S.E. Dismuke. Department of Medicine, University of Tennessee Center for the Health Sciences, Memphis, Tennessee, USA.

The frequency and clinical characteristics of autopsied surgical patients dying with pulmonary embolism (PE) were studied at a University hospital from 1966-1976. During this period a standard autopsy protocol was in use. All patients in whom PE occluded the equivalent of at least one lobar artery were studied. Information collected in all adult deaths confirmed the year to year similarity of patient characteristics and likelihood of autopsy. In order to assess the role of PE in a patient's death, cases were grouped separately by 2 criteria: 1) according to size of PE (3 groups: greater than 2/3 of pulmonary vasculature occluded, 1/2 - 2/3 occluded, less than 1/2 occluded); 2) weighing competing causes of death by having 3 physicians (randomly selected from a pool of 25) judge the likelihood of death after 1 month had PE been prevented (classifying them as primary PE death, contributory PE death, and death from competing causes). Sixty percent (900/1489) of surgical deaths were autopsied and 7.7% (69) had large emboli. The percentage of deaths from PE, using either criteria, has declined significantly ( $p < 0.01$ ) over time (1966-71 vs 1972-76): 10.5% to 4.5% for all cases studied and 5.5% to 2.1% in those where PE was the primary or a contributory cause of death. PE was the primary or a contributory cause of death in 3.9% (34 cases) of these autopsies. The clinical diagnosis of PE was considered in only 17% (6) of these cases but 63% (22) had no symptoms suggestive of PE prior to death. An infiltrate or effusion, however, was present in 60% (21) of cases and 80% (28) had 2 or more major risk factors for PE. In contrast to previous studies, this study demonstrates an impressive decline in surgical deaths from PE from 1966-1976 despite no routine use of prophylactic anticoagulation.