

THE DIAGNOSIS OF PULMONARY EMBOLISM: THE DIAGNOSTIC DILEMMA OF VENTILATION-PERFUSION LUNG SCANNING. R. Hull, D.L. Sackett, J. Hirsh, Department of Medicine and Epidemiology, McMaster University, Hamilton, Ontario, Canada.

After a promising introduction, many diagnostic tests prove with further experience to be very limited in their clinical application. There are two major reasons for inappropriate application of diagnostic tests. Firstly, the evidence for their clinical value is based on basic or experimental studies, the findings of which have been incorrectly equated with hard evidence for their clinical efficacy. Secondly, studies evaluating diagnostic efficacy have frequently failed to include essential design features which are required to adequately assess the sensitivity, specificity and predictive values of the test under evaluation. The diagnostic dilemma of ventilation-perfusion lung scanning is a classic example of the failure to adequately assess a diagnostic test. The diagnostic efficacy of ventilation-perfusion lung scanning is currently uncertain and highly controversial because none of the published studies have adequately evaluated this non-invasive approach. To resolve this uncertainty, we have incorporated the six essential criteria for evaluating diagnostic efficacy in a prospective study of ventilation-perfusion lung scanning and pulmonary angiography. These essential criteria are: comparison with pulmonary angiography, the reference test in consecutive patients; entering a broad spectrum of patients with suspected pulmonary embolism; including a large number of patients with varying clinical severity of illness and disease; and patients with a wide variety of co-morbid conditions; avoiding diagnostic suspicion bias by evaluating consecutive patients and by interpreting the test results independently without knowledge of each other or the patient's condition; and finally testing the clinical validity of negative results by long-term follow-up. The effect of these criteria on the outcome of this trial will be presented.

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FATAL PULMONARY EMBOLISM IN TOTAL HIP REPLACEMENT. H.O. Fredin and A.S. Nilius. Department of Orthopedic Surgery, Malmö General Hospital, Malmö, Sweden.

A retrospective study of fatal pulmonary embolism (FPE) was carried out in 1498 hips during 1968 - 1979. Dextran 70 was given as thromboprophylaxis, no anaphylactic reactions were registered. Sixteen patients died within 3 months, autopsy was made in fourteen cases. Nine patients died from FPE within 3 months, eight patients were autopsied.

Comparing this group with a surviving group chosen by random from the whole material we found that acute attacks of pleuritic chest pain was more common ($p < 0.001$) as well as previous operations for orthopedic and gynecological reasons ($p < 0.05$) in the group of FPE. No difference could be found between the groups concerning blood loss, amount of transfusion, sex, operated side, type of prosthesis and body weight.

Conclusions: 1. FPE was the most common cause of death within 3 months after THR.

2. The incidence of FPE was 0.6% in 1498 patients treated with Dextran 70 prophylaxis.

3. Acute attacks of pleuritic chest pain in the postoperative period is an important symptom which should be followed by a lungscan to rule out pulmonary embolism.

4. Only chest radiogram is not sufficient for the evaluation of acute pleuritic chest pain after THR.

5. Heparin therapy for a short period did not prevent FPE in cases with scintigraphic diagnosis of pulmonary embolism.

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INCIDENCE OF VEIN THROMBOSIS, INCREASED PLATELET RELEASE REACTION AND THROMBOXANE SYNTHESIS FOLLOWING TOURNIQUET ISCHAEMIA. J. Zahavi, A.J. Price, J. Westwick and V.V. Kakkar. Thrombosis Research Unit, King's College Hospital Medical School, London, United Kingdom.

Deep vein thrombosis (DVT) was established by ascending phlebography in 121 meniscectomy (M) (mean age 34 years) and 27 total knee replacement (TKR) (mean age 62.9 years) patients, both procedures performed under ischaemia (by inflating a pneumatic tourniquet to 500 mm Hg). In 27 of the M, 10 TKR and another 10 patients undergoing herniorrhaphy (H) and served as controls plasma β -thromboglobulin (β TG) was measured by radioimmunoassay and in 22 M and 10 TKR patients plasma thromboxane B_2 (TxB_2) was also determined. The incidence of DVT was 29% in the M patients. It increased significantly with age reaching a level of 50% at 60 years. In the TKR group 49% developed DVT. There was also a positive correlation between the severity of DVT and patient age in both groups. The mean plasma β TG and TxB_2 rose sharply ($p < 0.001$) 5 min after the release of the tourniquet and were positively correlated to each other. The high level returned to the pre-operative level after 48 hours. In the H patients β TG did not alter significantly postoperatively.

The high incidence of DVT in the relatively young patients who underwent M (minor surgical trauma similar to that of H) reaching the incidence of TKR patients (major surgical trauma) at 60 years, suggests that tourniquet ischaemia may be an important factor in the development of venous thrombosis in these patients. The increased in-vivo platelet activation and thromboxane synthesis, indicated by the increased plasma β TG and TxB_2 levels, which was not detected in the H patients, suggests that platelets may play an important role in the initiation of the DVT in tourniquet ischaemia patients.

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EVALUATION OF THIGH LENGTH SEQUENTIAL LEG COMPRESSION IN THE PREVENTION OF DEEP VEIN THROMBOSIS. J. T. Hartman, R. P. Yost, W. W. Robertson, and H. F. Janssen, Texas Tech University Health Sciences Center, Lubbock, Texas 79430.

The present study is designed to evaluate the effectiveness of a thigh length sequential compression device (SCD) in the prevention of deep venous thrombosis (DVT) in patients undergoing hip operations (either fracture or elective). The night before the operation phlebography, doppler ultrasound and, when possible, ^{125}I fibrinogen scanning were used to evaluate venous flow in the patients' legs. The patients identified as being free of DVT complications were then fitted with the compression sleeves. Following surgery the venous evaluation tests were repeated on alternate days to determine if DVT complications had developed. Evidence of DVT formation was identified in 10 of the 52 control patients (who received leg elevation only) and in 1 of the 52 treated patients (who received the SCD plus leg elevation). The chi square statistic demonstrates a significant difference between the two groups ($P < .05$).

Data evaluation indicates that surgical approach and patient obesity did not contribute to the risk of DVT formation. However, patients who are either over the age of 66, females, or have suffered a hip fracture appear to be at greater risk than other groups. The amount of data in this study makes it difficult to evaluate with statistical significance the additional risk produced by other factors such as heart condition, previous history of clotting problems, estrogen therapy, etc.