R. McKenna, F. Bachmann, S. P. Kaushal and J. Galante (Presbyterian St. Luke's Hospital, Chicago, Illinois, U.S.A.): **The Phlebo-Dynastat: A New and Effective Method of Prophylaxis for Deep Vein Thrombosis. (293)**

Peripheral deep vein thrombosis (DVT) is a frequent complication of orthopedic surgery. Evaluation of new methods of prophylaxis is necessitated by the disadvantages of the popular low dose heparin method.

In a previous study we found a 50% (20/40) incidence of DVT in patients undergoing total hip or knee replacements. In this high risk group, we undertook a prospective study of the prophylactic value of the Phlebo-Dynastat – a previously undescribed intermittent pneumatic compression device which alternately inflates thigh and calf cuffs to a maximum pressure of 30 mmHg. Seven patients had total knee replacements and 19 had total hip replacements. ^{125}I-fibrinogen scanning was started pre-operatively in all patients. Venography was performed on 25 limbs in 19 patients. Patients were assigned to treated or untreated groups by random numbers. Seven of 12 untreated patients developed DVT complicated by pulmonary embolism in 3, but only 1/14 patients in the treated group developed DVT. This difference is significant at the 0.009 level (Fisher's exact probability). DVT did not occur in 3 treated patients with shortened activated partial thromboplastin time but occurred in 2/3 untreated patients.

We are reporting a new previously undescribed method for preventing DVT and have demonstrated its effectiveness.

U. F. Gruber, Th. Hongler, W. Jung, O. Hutter, E. Steinmann and H. Schmitt (Department of Surgery, Kantonsspital, 4004 Basel, Switzerland): **Repeated Phlebographies for Follow-Up of Deep Vein Thrombi. (294)**

In a prospective, randomised, controlled study comparing the effectiveness of minidose heparin and dextran 40 for reducing deep vein thrombosis (DVT) after major surgery, we have shown that in the control group 36% of the 107 patients so far studied develop DVT, 13% of the 105 patients in the heparin group and 20% of the 104 in the dextran group. Both heparin and dextran show a statistically significant effect. In addition we carry out repeated phlebographies in all patients developing DVT as proven by the fibrinogen test. Immediately after the diagnosis is made, a first phlebography is carried out, a second one 14 days later. Results:

	Controls	Heparin	Dextran
n patients with 1st phlebogram	12	4	15
n patients with 2nd phlebogram	7	4	5
thrombus retracted in	4	2	3
thrombus disappeared in	3	1	2

Only 1 thrombus, in a heparin patient, increased in size.

It is hoped to gain further insight into the course of an established thrombus and how it is influenced by drugs as s.c. heparin and dextran by continuing this extremely time-consuming and difficult study, since it is not easy to carry out repeated phlebographies in the same patient.

I. C. Gordon-Smith (London, UK): **Postoperative Deep Vein Thrombosis. (295)**

Subcutaneous heparin therapy has been shown in several recent studies to be an effective agent in the prevention of postoperative deep vein thrombosis (DVT). However, DVT has not been abolished by such therapy and an increase in haemorrhagic complications, notably wound haematomata, has been reported after its use.

In an ongoing double blind randomised controlled study the effects of heparin on DVT and postoperative complications have been correlated with blood heparin levels. Thus far some fifty patients have been studied with the following preliminary conclusions:

(I) Subcutaneous heparin administration results in markedly variable blood levels, being maximal two hours after injection at between 0.01–0.30 I.U./ml.
(II) 12-hourly injections of 5000 I.U. heparin did not have a cumulative effect over one week.
(III) Of seven patients with blood heparin levels in excess of 0.2 I.U./ml, four developed a wound haematoma. Of seventeen patients with blood heparin levels of less than 0.2 I.U./ml only two patients developed this complication.
(IV) Thus far ^{125}I-Fibrinogen detected DVT has not occurred in the heparin treated patients.

T. Gaudernak, H. Kuderna, F. Olbert, H. Pelinka and G. Schlag (Lorenz Böhler-Krankenhaus, A – 1200 Wien XX, Austria): **A Randomized Comparative Study on Early Prophylactic Treatment of Thrombosis Using Heparin and High-Molecular Dextran Following Injuries of the Lower-Leg.** **(296)**

A randomized study was carried out on 50 patient suffering from lesions in the lower segment of the leg (fractures and ruptures of Achilles tendon). The patients were divided into two groups treated with Heparin (3×5000 i.u./die) and Dextran – 70 500 ml/die. respectively.

The incidence of thrombosis was as high as 44%. In all cases, however, it remained limited to the veins of the tibial region. No significant difference was found between Heparin and Dextran patients.

Control by phlebography carried out after one year in 38 patients indicated rechannelling of the affected veins in all patients. It also showed deep lesions of the veins in the form of a post-thrombotic syndrom (II/2) in three patients.

This leads to the conclusion that immediate administration of Heparin or Dextran – 70 is strongly to be recommended for patients suffering from a recent fracture in the tibial region as a prophylactic measure against thrombosis. It greatly reduces the incidence of pulmonary emboli or of the frequent post-thrombotic syndrome.

H. M. Chiu, W. Yung and J. Hirsh (McMaster University, Hamilton, Canada): **Efficacy and Monitoring of Heparin Therapy in Experimental Venous Thrombosis.** **(297)**

Opinions differ regarding the most effective means of administering heparin therapy. We have compared 1) the effectiveness of continuous intravenous infusion with intermittent intravenous injection and 2) the relative effectiveness of using heparin level and activated partial thromboplastin time (APTT) for monitoring heparin in experimental venous thrombi in rabbits. Thrombus extension was quantitated by measuring the net accretion of ^{125}I rabbit fibrinogen onto non-radioactive experimental venous thrombi over a 10 hour period. Fifty-four animals received heparin and 30 controls received saline. Heparin was administered by 1) continuous infusion in the following doses: a) initial bolus 200 U/kg followed by 400 U/kg infused in 10 hrs (full dose), b) 3/4 of full dose and c) $^1/_2$ of fulldose; 2) by intermittent intravenous injection of a) 200 U/kg, b) 150 U/kg and c) 100 U/kg 4 hourly. All 3 continuous intravenous regimens showed significantly less accretion than the control animals, however, of the intermittent regimens only the full dose regimen showed significantly less accretion than the controls. Continuous heparin in both full dose and 3/4 dose showed significantly less accretion than the corresponding intermittent intravenous heparin regimens. The antithrombotic effect of heparin was reflected by both the heparin level and the APTT. The experiments were repeated with continuous intravenous heparin following infusion of cryoprecipitate into rabbits. This shortened the pre-heparin APTT and reduced the post-heparin APTT rise. Optimal suppression of thrombus extension in both normal and cryoprecipitate treated rabbits was obtained when APTT was maintained at approximately twice pre-treatment level.