Postoperative deep vein thrombosis: identifying high-risk patients

A J CRANDON, K R PEEL, J A ANDERSON, VALERIE THOMPSON, G P McNICOL

Summary and conclusions

A prospective study was carried out to confirm the validity of a predictive index for patients at risk of developing deep vein thrombosis. The index, which correctly identified nine out of 10 patients and incorrectly identified seven out of 52 patients as being at risk, is based on five variables—namely, the euglobulin lysis time, serum concentration of fibrin-related antigen, age, percentage overweight for height, and presence of varicose veins.

Thus a population of patients at particularly high risk of developing postoperative deep vein thrombosis may be identified preoperatively by means of this index, so that prophylaxis may be used more rationally.

Introduction

Evidence suggests that prophylactic low-dose subcutaneous heparin reduces the incidence of postoperative deep vein thrombosis. Such treatment, however, is associated with an increased risk of bleeding. Prophylaxis for all patients entails giving unnecessary treatment to many who would not have developed deep vein thrombosis in any case. One answer is to restrict prophylaxis to patients with a high risk of deep vein thrombosis in whom, therefore, exposure to the risks of prophylaxis is justified.

Methods and patients

Euglobulin lysis time was measured using the method of Blixt and serum fibrin-related antigen by latex agglutination using the Thrombo-Welcocottest. Preoperative height and weight were measured on admission with the patient wearing night attire and in bare feet. The percentage overweight for height was then estimated. The predictive index was calculated for each patient using the formula of Clayton et al:

\[ I = -11.3 + 0.009a + 0.22b + 0.085c + 0.043d + 2.19e \]

where a = euglobulin lysis time (minutes), b = concentration of fibrin-related antigen (mg/l), c = age (years), d = percentage overweight for height, and e = presence or absence of varicose veins (scored as 1 or 0 respectively).

An index value was calculated for each of 62 consecutive patients aged 40 years or older about to undergo major gynaecological operations by either the abdominal or vaginal route. The indications for surgery were malignant disease in 11 patients (17.7%) and benign disease in 51 (82.3%). The malignant disease was uterine in five patients (8.1%), cervical in four (6.5%) and ovarian in two (3.2%). Of the patients with benign disease, 21 (33.9%) had dysfunctional bleeding, two (3.2%) fibroids, 20 (32.2%) prolapse, and eight (12.9%) miscellaneous diseases. None of the patients received specific prophylaxis to prevent postoperative deep vein thrombosis, and the predictive index value was unknown when they were screened for the presence of this condition postoperatively.

Diagnosis of deep vein thrombosis—All patients underwent isotope
scanning of their legs before and after operation, using 125I-fibrinogen scanning. Deep vein thrombosis was diagnosed when a difference in uptake of 20% or more was found between adjacent points on the same limb or the same point on the contralateral limb and this difference persisted for 24 hours or more. Routine postoperative scanning was performed on the first, third, and sixth days, but if a high count was obtained daily scanning was started. All positive scans were confirmed by ascending phlebography.

### Results

No patient had clinical or isotopic scan evidence of deep vein thrombosis before surgery. Of the 62 patients, 10 developed deep vein thrombosis postoperatively. The table shows the median values and interquartile ranges of the variables incorporated in the predictive index, and the figure shows the distribution of index values. Good results were obtained in the patients with a high-risk profile.

<table>
<thead>
<tr>
<th>Patients not developing deep vein thrombosis</th>
<th>Patients developing deep vein thrombosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median (min)</td>
<td>117.5</td>
</tr>
<tr>
<td>Interquartile range</td>
<td>107.5</td>
</tr>
<tr>
<td>Median (min)</td>
<td>197.5</td>
</tr>
<tr>
<td>Interquartile range</td>
<td>366.3</td>
</tr>
</tbody>
</table>

**Distribution of the five variables in the predictive index subdivided according to whether patients did or did not develop deep vein thrombosis.**

<table>
<thead>
<tr>
<th></th>
<th>Patients not developing deep vein thrombosis</th>
<th>Patients developing deep vein thrombosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>44.0</td>
<td>14.0</td>
</tr>
<tr>
<td>Percentage overweight for height</td>
<td>13.7</td>
<td>12.7</td>
</tr>
<tr>
<td>Serum fibrin-related antigen (mg/l)</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Euglobulin lysis time (min)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>No (% of patients with varicose veins)</td>
<td>21 (40)</td>
<td>9 (90)</td>
</tr>
</tbody>
</table>

The distribution of the variables in the predictive index is shown in the figure. The data show that the distribution of the variables is similar in the two groups of patients, but that the patients who developed deep vein thrombosis had a higher risk of developing the condition.

### Discussion

These data confirm the findings of Clayton et al. that five preoperative observations will identify patients at high risk of developing postoperative deep vein thrombosis. They also show that the index had good predictive power when applied prospectively to gynaecological patients.

When –2 was taken as the cut-off point nine (90%) of patients who subsequently developed deep vein thrombosis were correctly allocated, while only seven (13.5%) were incorrectly identified as being at risk. This discrimination is as good as that obtained when the same cut-off point is applied to the data of Blix et al. In all, Rakoczi et al. also found that this index effectively differentiated a population at high risk of developing postoperative deep vein thrombosis, but the distribution of their results was shifted appreciably to the right because of longer euglobulin lysis times; their assays were performed on stored frozen platelet-poor plasma, which probably accounted for this variation.

This index appears to be a valuable way of predicting preoperatively patients who are at high risk of developing postoperative deep vein thrombosis.

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### References


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