Prevention of postoperative deep vein thrombosis

Thirty years ago, Sevitt and Gallagher\(^1\) established that full anticoagulation with an oral anticoagulant significantly reduced the incidence of post-traumatic deep vein thrombosis and pulmonary embolism; but their prophylactic regimen was not widely adopted by general or orthopaedic surgeons because of the logistical problems of haematological control and the unacceptable incidence of bleeding complications.

Between 1971 and 1975, many groups of investigators confirmed that a small dose of heparin given subcutaneously significantly reduced the incidence of deep vein thrombosis and these studies were followed by two large multicentre trials\(^2,3\) which strongly suggested, but did not to my satisfaction conclusively prove, that subcutaneous heparin also reduced the incidence of fatal pulmonary embolism. In the same period many mechanical methods of prophylaxis were studied\(^4\); the simplest was graduated compression stockings which were found to be almost as effective against deep vein thrombosis as the more complex techniques, but no mechanical method has yet been properly tested against the end points of pulmonary embolism or total mortality.

If there are both pharmacological and mechanical methods which effectively reduce the incidence of deep vein thrombosis why do we not all use them? Overall, the pharmacological methods are more effective than the mechanical methods but the injection of heparin every 12 or 8 h has logistical problems, a small complication rate, and is not always effective particularly after major orthopaedic operations. Consequently, many have been searching for a simpler and hopefully still more effective pharmacological alternative. Low molecular weight heparin may be the answer\(^5\). Two recent papers\(^6,7\) examining over 1200 patients have confirmed that a single daily dose of low molecular weight heparin has the same effect on postoperative deep vein thrombosis as the standard unfractionated heparin regimen with possibly fewer bleeding complications, but this drug still has to be tested for an effect on pulmonary embolism and total mortality.

What should the busy surgeon do? The simplest and most effective way of preventing deep vein thrombosis after general surgical operations on patients over the age of 60 years, in whom bleeding is not a serious surgical risk, is probably subcutaneous low molecular weight heparin daily combined with anti-embolism stockings. High-risk patients in whom bleeding is not a serious hazard may be better protected by full anticoagulation; but in patients where bleeding could be a serious hazard to life or limb, pneumatic compression during the operation plus anti-embolism stockings, though less effective, is safer. Patients under 60 years of age without any special risk factors probably just need stockings and/or intra-operative pneumatic compression.

This scheme can also be applied to orthopaedic patients with the possible addition of dihydroergotamine to the heparin in the hope that it may enhance the effect of the heparin. However, patients undergoing hip replacement surgery will still be at significant risk as they are more resistant to all forms of prophylaxis.

Will these methods abolish deep vein thrombosis and pulmonary embolism? No. No method is 100 per cent effective and in sick patients the deep vein thrombosis may have begun before the prophylaxis is commenced. Thus the administration of a prophylactic regimen should not reduce clinical awareness of the physical signs of deep vein thrombosis or pulmonary embolism, however unreliable they may be, so that secondary prophylaxis can be instituted.

The above opinions are based on my interpretation of the available evidence\(^8\). The scientist in me still believes that any new regimen should not be adopted before it has been properly tested against pulmonary embolism and total mortality in a large controlled clinical trial. However the desire of surgeons to do their best for their patients, their willingness to base their opinions on less than perfect evidence and their subsequent resistance to studies with untreated control patients makes it unlikely that such trials will ever be conducted. The result is an evolving form of treatment which becomes incorporated into medical practice although its value in scientific terms...
has not been proved—just as many of the other indications for the exhibition of anticoagulants are unsubstantiated. I hope that someone someday will not prove that we have got it wrong.

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