

Effective Prophylaxis for Deep Vein Thrombosis After Stroke

Low-Dose Anticoagulation Rather Than Stockings Alone: Against

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Approximately 5% of hospitalized stroke patients have a clinically apparent deep vein thrombosis (DVT) and $\approx 2\%$ will have a pulmonary embolus (PE) confirmed.¹ However, prospective studies that systematically screen for DVT with, for example compression Doppler ultrasound or magnetic resonance imaging, identified DVT in up to 50% of patients.² Some patients who are breathless because of aspiration pneumonia, chest infection, or heart failure may actually have had an undiagnosed pulmonary embolus. Autopsies often identify clinically unrecognized PEs that probably contributed to the patient's death. Therefore, it seems sensible to offer patients prophylaxis against venous thromboembolism. However, a brief discussion with colleagues is likely to reveal wide variation in the approaches taken to prophylaxis.

In our unit, we aim to treat all patients with ischemic stroke with aspirin within 48 hours, because this has been shown to improve long-term outcomes and probably also reduces the risk of venous thromboembolism to some extent.³ In addition, we try to ensure that patients are adequately hydrated and mobilized as early as possible. These interventions will, we hope, reduce other complications as well, although we acknowledge the lack of direct evidence for the benefits of either of these interventions.

We reserve low-dose subcutaneous heparin (5000 U twice daily) for a small number of carefully selected patients. The systematic reviews of all the randomized control trials of heparin in acute ischemic stroke suggest that although heparin is likely to substantially reduce the risk of both DVT (at least that detected on isotope labeled fibrinogen) and of PE, it does not, on average, improve patients' survival or their functional outcome.⁴ Any reduction in venous thromboembolism, and early recurrent cerebral ischemic events, appears to be completely offset by an increase in hemorrhagic complications (the most disabling being symptomatic intracranial hemorrhage). Thus, we only use heparin for DVT prevention in selected patients who we believe have a much greater than average risk for venous thromboembolism and a less than average risk for hemorrhagic complications. The criteria we use are based on "common sense" rather than hard

evidence, which does not exist. Thus, we would consider low-dose heparin in an obese stroke patient with severe leg weakness and a history of previous venous thromboembolism, known disseminated malignancy, or some other prothrombotic state. We would avoid heparin in those with larger cerebral infarcts but would be less worried in patients with a lacunar infarct in which hemorrhagic transformation appears to be unusual. Today, we might, rightly or wrongly, avoid heparin if gradient echo magnetic resonance imaging has shown microhemorrhages.

Far more controversial than the use of heparin in our view is the assumption made in the title of this "controversy" that stockings should represent the standard approach. We currently do not routinely apply graduated compression stockings (GCS) to the legs of immobile stroke patients because we are uncertain that they are of net benefit. We do not believe that the available evidence is sufficient to justify their routine use.

The evidence that GCS stockings prevent DVT comes from meta analyses of ≈ 19 small randomized control trials, which together suggest that they reduce the risk of DVT by approximately two-thirds.^{5,6} However, 17 of these trials were in surgical patients. In surgical patients, unlike those with stroke, GCS can be applied before the onset of paralysis; paralysis is usually brief and mobilization rapid. In patients with peripheral arterial disease, diabetes, and peripheral neuropathy (which are more common in stroke than the average surgical patient), GCS can cause skin necrosis, which may even lead to amputation. They have other less serious but nonetheless important disadvantages. Stroke patients, and especially those with urinary incontinence, find GCS uncomfortable. GCS are time-consuming to apply and monitor properly and the time nurses spend on this activity might be better spent in other ways if GCS are not effective. Only one randomized control trial has tested stockings in stroke patients, and this was far too small to provide a reliable estimate of effect.^{6,7} Interestingly, although below-knee GCS are used, almost all the trial evidence is based on the full-length variety.

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We enroll our patients in the CLOTS (Clots in Legs Or TEDS after Stroke) Trial, which is a family of 2 multicenter international randomized control trials funded by the UK Medical Research Council (www.clotstrial.com). Trial 1 aims to establish whether full-length GCS reduce the risk of DVT after stroke, and trial 2 aims to establish if full-length stockings are more effective than below-knee GCS. In the CLOTS trial, some patients get stockings and others avoid them, but all benefit from routine noninvasive screening for DVT, and thus the possibility of early treatment for occult DVT. We reckon this is the best management we can offer at this time.

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