

# Deep Vein Thrombosis

## – still a problem in 2014

*By Philip Coleridge Smith DM MA BCh FRCS  
Consultant Vascular Surgeon and Medical Director, British Vein Institute  
and Reader in Surgery, UCL Medical School*

➤ **EACH YEAR 25,000 PEOPLE** in England die from venous thromboembolism (VTE). This figure includes patients admitted to hospital for medical care of serious illnesses as well as those admitted for surgery, according to the House of Commons Health Committee.<sup>1</sup> This is a larger number of deaths than are attributable to breast cancer, AIDS and road traffic accidents.

There is a risk of spontaneous thrombosis arising in the deep veins of the leg and pelvis (and sometimes other anatomical locations) of between 1 to 2 per thousand people per year. However, a number of diseases and treatments greatly increase this risk. In particular, surgical treatment in hospital gives rise to an increase in this risk of about 25 to 230 fold, depending upon the operation and the indication for treatment. In fact, admission to hospital for any reason leads to a doubling of the risk of deep vein thrombosis over the following 6 months.<sup>2</sup>

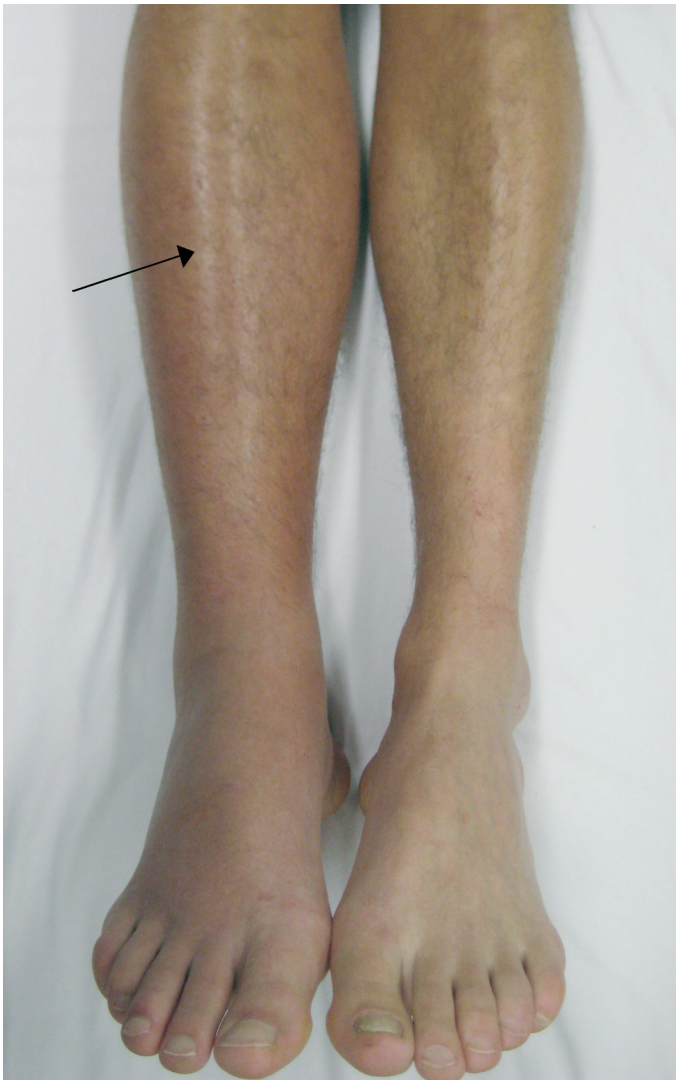


Image: James Heilman, MD© via Wikipedia

There is an association between long haul air travel and deep vein thrombosis but the overall absolute incidence of a symptomatic DVT in the month following a flight of greater than four hours is 1 in 4,600 flights. Long haul air travel is a modest risk factor compared to treatment in hospital.

The National Institute for Health and Clinical Excellence (NICE) has published guidelines for identifying patients at risk of deep vein thrombosis during hospital treatment and recommended methods for reducing the risk of DVT.<sup>3</sup>

### Which hospital patients are at risk of DVT?

NICE advises that the following patient features may increase the risk of a DVT arising during or following hospital treatment:

- Active cancer or cancer treatment
- Age over 60 years
- Critical care admission
- Dehydration
- Known thrombophilias
- Obesity (body mass index [BMI] over 30 kg/m<sup>2</sup>)
- One or more significant medical comorbidities such as: heart disease; metabolic, endocrine or respiratory pathologies; acute infectious diseases; inflammatory conditions
- Personal history or first-degree relative with a history of VTE
- Use of hormone replacement therapy
- Use of oestrogen-containing contraceptive therapy
- Varicose veins with phlebitis

A risk assessment should be performed in all patients admitted to hospital for any reason in order that the presence of any of these features can be identified. Failure to undertake such a risk assessment might be considered substandard care. If any of the factors in this list are present specific measures should be taken to prevent deep vein thrombosis.

### What can be done to prevent DVT?

Treatments which can reduce the risk of DVT include mechanical methods, such as pneumatic compression sleeves and graduated elastic compression stockings as well as anticoagulant drugs. Mechanical methods have been shown to be effective following surgical procedures but are not appropriate in patients with arterial disease in the leg or loss of sensation due to diseases of the peripheral nerves. Ulceration of the leg or gangrene may arise from excessive compression of the legs with stockings in these patients.

Several anticoagulant drugs have been studied in considerable detail in many studies conducted in medical and surgical patients. The most commonly used drugs for the prevention of DVT are low molecular weight heparins (LMWH) which reduce the risk of DVT by about 80% in surgical patients. These drugs must be given by daily subcutaneous injection which is not always very popular with patients.

A series of new drugs has been developed which can be taken orally on a daily basis and are licensed in the UK (as well as many other countries) for the prevention of deep vein thrombosis. These are especially useful once patients have been discharged home but have a continuing risk of deep vein thrombosis. Two drugs licensed in the UK for this application are dabigatran (Pradaxa®) and rivaroxaban (Xarelto®).

Anticoagulant treatment gives rise to the risk of bleeding and should not be used in patients with a bleeding risk such as those with active



bleeding or a bleeding disorder. Patients with active peptic ulceration or taking aspirin or a non-steroidal anti-inflammatory drug may also be at risk. Anticoagulant drugs should not be used in these patients since serious bleeding may arise leading to the risk of death.

### Selection of the correct method of DVT prevention

The exact method of prevention of deep vein thrombosis depends upon the condition that the patient is being treated for as well as which risk factors apply from the list above. In general, medical patients should receive anti-coagulant drugs at a low concentration which provides protection against the start of a DVT. The most common regimes include the injection of low molecular weight heparins.

The use of medical compression stockings has been shown to be ineffective in patients receiving treatment for stroke, so the use of low molecular weight heparin is appropriate in this group, following assessment of the risk of bleeding related to stroke.

The duration of the risk of stroke depends on the time taken for the patient to recover which will vary considerably. In these patients the main risk arises from immobility secondary to the stroke. NICE advise that, once the patient is stable, the treatment regime can be reviewed without specifying a particular duration of treatment.

Amongst patients undergoing surgical intervention, those receiving hip and knee replacements are at high risk of post-operative deep vein thrombosis. This group require systematic management to ensure thrombotic complications are avoided. The use of combined mechanical and pharmacological means of prophylaxis is recommended which provide greater protection in combination than either used alone.

The drugs which may be used include the injectable low molecular weight heparins as well as the oral antithrombotic drugs rivaroxaban and dabigatran. The recommended duration of treatment is 28-35 days although the duration of hospital admission is likely to be in the range 3-7 days. Arrangements must be made for the treatment to continue at home where oral anticoagulants are more acceptable.

Patients in other surgical groups are generally considered to require a mechanical method of prevention, such as anti-embolism stockings combined with a pharmacological method. The duration of treatment is suggested to be in the range 5-7 days.

### Duration of prophylactic treatment

Much of general surgery is done as a day case procedure where the patient leaves the day surgery department long before full recovery from the treatment has been achieved. During the recovery period, reduced post-operative mobility leads to a continuing risk of deep vein thrombosis. Prophylaxis should be provided for this period. The anti-coagulant drugs used to prevent deep vein thrombosis have been studied for efficacy in clinical trials where a 5-7 day period of treatment has been given after general surgery. This is increased in high risk knee and hip surgery to 28-35 days.

There has been a practice in the past in which a single injection of low molecular weight heparin was given to protect against DVT following day case surgery. However, the drug manufacturers have no data with which to assess the efficacy of such a regime and recommend a 5-7 day period in their instructions for use of the drugs.

Relying on a regime which differs from that in the drug's '*summary of product characteristics*' lies outside the licensing of that drug and the prescribing doctor assumes responsibility for the inadequacies of the regime. Where a patient is considered to need prophylaxis with anticoagulant drugs following their surgery, arrangements must be made for completion of the regime once they return home.

The author is aware of one paper which includes observations in a group of varicose vein patients, some of whom received a single injection of heparin following their surgery. Others received no prophylaxis. About 5 % of patients were found to have DVT on ultrasound imaging. There was no difference in the frequency of DVT amongst those who received a single dose of heparin and those who received none. This was an observational study but adds no support to the assumption that a single dose of heparin will protect against deep vein thrombosis.

In conclusion, the normal duration of prophylaxis specified by the

drug companies is in the range of 5-7 days, but it is longer for hip and knee replacement operations where it is in the range of 28-35 days. Should a patient who would be considered at risk of venous thrombosis develop a DVT when the duration of prophylactic treatment used was less than that specified in NICE CG92 this could be considered substandard medical management.

### Conditions where prophylaxis is not required

In general, major fractures to the long bones of the lower limb are managed by surgical reduction and fixation with various types of metal plates and pins. Prophylactic treatment following surgery would be indicated and should be continued until the patient regains normal mobility. However, fractures around the ankle and of the foot not involving the major long bones may not need surgical treatment. The limb is encased in a plaster cast and the patient encouraged to mobilise using crutches. Such patients remain at increased risk of DVT due to their injury and relative immobility.

These patients should receive written information warning of the possibility that a DVT may occur and be advised to seek medical advice should symptoms suggesting this problem arise. Current consensus documents confirm that no pharmacological regime has been established in this group of patients which can be recommended for general use. It is acceptable for patients in this group to await the development of any symptom suggesting of deep vein thrombosis. Should this arise the diagnosis can be established on ultrasound imaging of the lower limb veins and treatment for a DVT commenced.

### When a DVT does develop

It is important to remember that all of the measures currently in use reduce the risk of a DVT arising but cannot eliminate this completely. Patients receiving anticoagulants at a prophylactic dose can still develop a DVT. Patients should be encouraged to report any symptom such as a calf pain or limb swelling so that further investigations can be done to detect a possible DVT. Timely treatment for a DVT will lead to a much better outcome than if this treatment is deferred when symptoms of limb swelling are dismissed as attributable to the result of the fracture or treatment for the fracture. A post-thrombotic syndrome with long term pain and swelling of the leg may arise with the risk of leg ulceration when treatment for a DVT is delayed by some weeks.

### Clinical cases

Despite the well known symptoms of DVT and risks of pulmonary embolism arising from this, the author has provided opinions concerning a number of cases of fatal pulmonary embolism.

In one case, a 37 year old female patient fell during a sporting event and injured her ankle. She was taking the oral contraceptive pill, a risk factor for the development of a DVT.

A fracture of the distal fibula at the ankle was the problem shown on x-ray at the hospital. The patient underwent surgical treatment of a duration of 1h 15 mins to reduce and fix the fracture with a metal plate. No risk assessment was done for DVT and the patient received no mechanical or prophylactic drug treatment to protect her from deep vein thrombosis.

She attended the fracture clinic 10 days after her operation, having been discharged home the day following surgery. She had pain and swelling in the left calf which were reported to the surgeon in the fracture clinic. The patient was found to have a satisfactory radiological outcome from her surgery and her symptoms of pain and swelling in the calf were attributed to the fracture and its treatment.

Symptoms in the patient's calf became worse with severe pain and tightness of the calf. This was strongly suggestive of a deep vein thrombosis. This was again reported to the orthopaedic surgeon after another month had elapsed. Although the patient was able to show the orthopaedic surgeon that the leg was swollen and very painful, he reassured her that this was normal.

The patient became a little more mobile following removal of the plaster but collapsed and died from a massive pulmonary embolism 10 days after her last attendance at hospital. This case was settled for a large sum.



The DVT should have been prevented by the admitting hospital undertaking a risk assessment and providing appropriate prophylaxis after the surgery. She subsequently visited the fracture clinic twice where symptoms strongly suggestive of deep vein thrombosis were present but were dismissed as attributable to the fracture and its treatment. Proper investigation by duplex ultrasound imaging should have been done and this would have shown the extensive DVT in the patient's leg. Full dose anticoagulant treatment would then have been given leading to resolution of the DVT and avoidance of fatal pulmonary embolism.

NICE have now published more information on the correct management of deep vein thrombosis.<sup>4</sup> Treatment for venous thrombosis should now comply with this guideline to be considered good medical practice.

In conclusion, hospital patients remain at risk of deep vein thrombosis unless appropriate measures are taken to prevent this. A clear regime of prevention is set out in NICE CG92 which all hospitals should comply with. Failure to comply with this regime might lead patients to be unnecessarily exposed to the risk of DVT leading to fatal pulmonary embolism. Should a DVT arise when the NICE guidelines have not been complied with, substandard treatment may be considered to have been provided.

#### REFERENCES

<sup>1</sup> House of Commons Health Committee. (2005) *The prevention of venous thromboembolism in hospitalised patients*. London, 2005: The Stationery Office Limited.

<sup>2</sup> Hippisley-Cox J, Coupland C. *Development and validation of risk prediction algorithm (QThrombosis) to estimate future risk of venous thromboembolism: prospective cohort study*. BMJ. 2011 Aug 16;343:d4656

<sup>3</sup> NICE Clinical Guideline 92: *Reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to hospital*. NICE, January 2010.

<sup>4</sup> NICE Clinical Guideline 144: *Venous thromboembolic diseases: the management of venous thromboembolic diseases and the role of thrombophilia testing*. NICE, June 2012.

**Mr Philip Coleridge Smith DM MA BCh FRCS**  
**Consultant Vascular Surgeon**  
**Medical Director, British Vein Institute**



**19 years**

Defendant instructions

Claimant instructions

Single joint expert

Court experience

**Areas of experience:**

- Surgery of veins and arteries
- Sclerotherapy & laser ablation of varicose veins
- Varicose veins
- Deep vein thrombosis
- Pulmonary embolism
- Leg ulcer
- Lymphoedema
- Peripheral ischaemia
- Injury to blood vessels
- Medical negligence and personal injury

**Office address:**

British Vein Institute, 24-28 The Broadway, Amersham HP7 0HP

Tel: 0870 609 2389 Fax: 0872 111 7042

Email: [p.coleridgesmith@bvi.uk.com](mailto:p.coleridgesmith@bvi.uk.com)

Web: [www.medical-expert-witness.co.uk](http://www.medical-expert-witness.co.uk) [www.bvi.uk.com](http://www.bvi.uk.com)