

DEEP VENOUS THROMBOSIS AFTER AIR TRAVEL

While the link between travel and deep vein thrombosis (DVT) or venous thromboembolism (VTE) was recorded in 1954, travel risks and aetiology have not been resolved.¹



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Debate continues, although a significant link has been considered for many years.² A consensus meeting convened by the World Health Organization (WHO) in 2002 concluded that there was probably a link, although the incidence of DVT/VTE was considered low and mainly occurred in travellers with additional risk factors for DVT.³ More recently a positive correlation between multiple long-distance air flights and DVT/VTE, even in individuals with low to moderate risk factors for disease, has been established.⁴

EPIDEMIOLOGY OF DVT

While considerable attention has been focused on DVT and VTE, the contribution of air travel to the development of these conditions in travellers remains uncertain. It seems to be clear that the development of DVT and VTE is multifactorial.³ It is established that prolonged, quiet sitting, such as that associated with long-haul air travel, carries a risk of DVT and VTE.⁵ While healthy travellers seem to be at very little risk, even during long-haul air travel, travellers with associated risk factors for thromboembolism (Table I) appear to be at considerable risk. The incidence of developing DVT after a long-haul flight is cited at approximately 1 in 200 000 for travellers on a 12-hour long-haul journey.⁸ The association between prolonged immobility in a sitting position and venous thrombosis was described in a recent case study involving prolonged immobility from sitting at a computer. The authors suggested the term 'e-thrombosis' to describe this phenomenon.⁹ The fact that travel lasting longer than 4 hours is associated with an increased risk of VTE² suggests that immobility may at least play a role in the process. However, as Bagshaw¹⁰ has indicated, with the exception of prolonged immobility, the evidence is weak for other commonly reported cabin-related risk factors (summarised in Table I).

INVESTIGATION AND MANAGEMENT OF DVT

Recent research of inpatients suggests that bilateral ultrasound scanning is indicated when a DVT/VTE is confirmed on the symptomatic side, as about 5% of thrombus is found in the asymptomatic leg and about 5% in both legs.¹¹ This was illustrated by a recent case report of bilateral DVT in a traveller returning to New Zealand.¹² However, bilateral thrombus was not as common in outpatients.⁹ Such cases need to be treated and monitored closely as progression of DVT of the calf is regarded as an adverse clinical event associated with greater chance of pulmonary embolism and death.¹³

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The usual treatment in such cases is a 5 - 10-day course of heparin followed by 3 - 12 months of oral anticoagulation with warfarin. The degree of anticoagulation should achieve an INR between 2.0 and 3.0.¹⁴ The estimated annual rate of recurrence of venous thrombosis has been reported as between 6% and 9%,³ but is quite variable depending on the course of treatment with warfarin and whether the patient has temporary or permanent risk factors.¹⁵ Despite this, until recently, no anticoagulant therapy regimen with an acceptable benefit-to-risk ratio has been demonstrated.¹³

The most serious risk associated with full-dose warfarin is major haemorrhage, at an estimated annual rate of 5 - 9%.³ McMahan *et al.*¹⁶ reported the incidence of major haemorrhage in outpatients treated with warfarin to be 7% at one year.¹⁶ This study also identified 3 independent predictors of major haemorrhage: chronic renal insufficiency, alcohol abuse, and previous gastrointestinal bleeding. A recent study by Ridker *et al.*⁵ investigated the use of lower-dose, prolonged warfarin therapy. This randomised, double-blind, placebo-controlled trial found that warfarin doses titrated to maintain an INR of between 1.5 and 2.0 resulted in a major reduction in recurrent venous thrombosis. Additional advantages of this approach include a

Table 1. **Potential risk factors for DVT/VTE^{6,7}**

Suggested patient-related factors

- Age — risk increases with increased age
- Overweight
- Cardiorespiratory disease
- Chronic heart disease
- Coagulation disorder
- Hormone therapy, including oestrogen medications
- Lesion of the popliteal vein wall
- Malignancy
- Other chronic diseases
- Postpartum, < 2 months
- Pregnancy
- Previous DVT or VTE
- Recent surgery or injury
- Smoking

Suggested cabin-related factors

- Coach position
- Dehydration
- Immobilisation
- Low air pressure with relative hypoxia and dehydration due to low humidity
- Low humidity
- Relative hypoxia

reduced incidence of major haemorrhage and a probable reduction in the frequency of INR measurements. The use of prolonged anticoagulant therapy has previously been suggested by others.^{17,18}

PREVENTION OF DVT/VTE

With regard to preventive measures for DVT/VTE, the recent WHO consultation on this issue concluded that currently there is only sufficient scientific information to recommend leg exercise during air travel.² Hence, conservative measures should be recommended to travellers, such as in-flight exercises, restriction of alcoholic and caffeinated beverages to prevent dehydration, and drinking of adequate amounts of water,¹⁹ which will at least help to reduce the risk of hypotensive episodes. Other preventive measures such as subcutaneous heparin for some at-risk cases are worthy of investigation.^{20,21} However, the WHO consultation warned about weighing up the risks of pharmacological therapy.²

Current epidemiological research and pathophysiological studies are of

value to establish which travellers are at greatest risk, and this should in turn lead to appropriate intervention studies. Two recent reports offer preventive strategies for travellers at risk of DVT/VTE. The LONFLIT3 study,²¹ which also observed bilateral DVT in some of their group sample (albeit in different veins in the lower limb), showed a significant DVT/VTE reduction in high-risk travellers treated with 1 dose of low-molecular-weight heparin. This study also suggested a decrease in DVT/VTE episodes in those taking 400 mg aspirin.²¹ However, further research is needed before it can be recommended routinely for long-haul flights.

Preventive advice given by airlines is mainly aimed at avoiding venous stasis. In the LONFLIT4 study²² almost all travellers who wore elastic compression stockings did not develop peripheral oedema. It also stated that superficial venous thromboses remain a risk for post-travel morbidity. Patients should be examined for these, in addition to DVT/VTE. Compression stockings have become much vaunted as a preventive measure for DVT/VTE

through studies such as those of Scurr *et al.*²³ Scurr *et al.*'s study demonstrated a reduction in asymptomatic DVT in people wearing compression stockings compared with the control group who did not wear them. There was criticism of this finding as lacking in scientific parameters.²⁴ Nevertheless, given that peripheral oedema predisposes to venous stasis, there is continuous worthwhile evidence that compression stockings reduce the incidence of DVT.²¹ These stockings also have few, if any, side-effects²² when worn correctly; thus it seems reasonable to recommend compression stockings as a prophylactic measure.

SCREENING FOR DVT/VTE

Clinical and haematological screening of travellers for potential risk factors for DVT/VTE is a growing option to target specific preventive advice. Such screening may include the use of D-dimers as a non-invasive aid to diagnosing DVT/VTE.²⁵ Screening can only

realistically be implemented if the risks of the screening procedure do not outweigh those of developing DVT/VTE. In the pre-travel consultation, advice should be given concerning prevention of DVT/VTE to those who have specific risk factors or a combination of risk factors. It is certainly worth considering the risk in returning travellers who

may exhibit possible signs and symptoms of DVT/VTE. The example has already been given where ultrasound screening of the opposite limb may be useful in those found to have calf DVT on one side.

References available on request.

IN A NUTSHELL

All travellers undertaking extensive, long-haul air travel (particularly those with the risk factors outlined in Table I) need to be warned of the risks of DVT and VTE and advised of appropriate preventive measures.

All travellers should be aware of the signs and symptoms of DVT/VTE and of the need to seek medical advice should they develop them, in order to help prevent progression of a DVT to a VTE.

The risks of screening for those at possible 'risk' for DVT/VTE should be weighed up against the risks of DVT/VTE itself.

When DVT is suspected and confirmed by ultrasound in one leg, the possible diagnosis of bilateral DVT and the need for bilateral ultrasound scanning of the legs need to be considered, particularly in symptomatic travellers undertaking long-haul air travel.



ADVANCED PAEDIATRIC LIFE SUPPORT COURSE

(administered by the UK-based Advanced Life Support Group)

This course is intensive and is held over three days. It is aimed at all emergency medicine specialists (including those in training) and especially at paediatricians and anaesthetists.

The pre-paid course fee of R2750 covers the cost of the new 4th edition of the APLS manual (presently retailing at approx R400), teas, lunches and a course function at the end of the first day. A maximum of 24 candidates can attend each course, with a faculty of 8 instructors. The course is fully accredited for a possible 38 CPD points.

Programme: Each day includes lectures, skills teaching/workshops and scenario play. The first day covers Basic/Advanced Life Support and Cardiac Scenarios. Day two focuses on the Seriously Ill Child and day three covers Trauma. There are written and practical exams.

The courses for 2005 will be held as follows:

EC01	East London	February 17, 18 & 19
JB08	Johannesburg	March 3, 4 & 5
CT08	Cape Town	April 14, 15 & 16
NAT04	Pietermaritzburg	May 26, 27 & 28
JB09	Johannesburg	July 28, 29 & 30
CT09	Cape Town	September 15, 16 & 17

If you are interested in attending a Johannesburg course please contact:
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