

Traveller's thrombosis

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Risk factors for thrombosis should be routinely sought in all travellers and preventive strategies discussed.

Pulmonary embolism (PE) following air flight was first described in 1954,¹ and was termed economy class syndrome in 1977.² This term is no longer used as we now know that venous thromboembolism (VTE) is not restricted to economy class passengers. Yet more than 50 years on from its first description we still lack definitive evidence based on adequately designed epidemiological studies for air flight being a cause *per se* of VTE.

Conflicting data from numerous studies of variable quality together with varying levels of media hype have resulted in confusion among many medical practitioners. Despite this, however, the overall picture is becoming clearer, with a number of common trends emerging, and it is now possible to offer some general advice to intending travellers. This advice applies not only for long duration travel in aircraft, but also for that in other confined spaces, such as cars, buses and trains.

Overall risk

Current data indicate that the risk of thrombosis associated with travel is relatively low, especially in healthy young people, and the risk of associated fatal PE is extremely low. The risk of death from VTE associated with air travel – about 1 per 2 million people flying – is very low

compared with that from motor vehicle and work accidents.³ While the incidence of deep vein thrombosis (DVT) in air travel has been reported at between zero and 10%,^{4,5} the reported incidence of significant PE is much lower at 0.25 to 0.4 per million.^{6,7} This is equivalent to the same rate as in the general nontravelling population.^{5,8}

One meta-analysis found no definitive evidence that air travel increases the risk of DVT.⁹ Another review study suggested a weak association between long distance air travel and asymptomatic VTE.¹⁰ However, it is clear from most studies that the risk of VTE is certainly increased with prolonged air flights (more than 8 hours' duration) if additional risk factors exist. It is, therefore, important for medical practitioners to screen intending travellers for additional clinical risk factors in order to offer appropriate preventive advice.

Individual risk factors

Specific risk factors for VTE in air travellers, as suggested by various studies, are listed in Table 1 (they are not in any particular order). One consistent finding is that prolonged sitting or immobilisation should be avoided, especially if in cramped conditions, regardless of the type of travel.¹¹

A New Zealand study found an overall incidence of VTE of 1% in air travellers flying for four hours or more.¹² This contrasts markedly with the Business class versus Economy Syndrome as a cause of Thrombosis (BEST) study, which compared 180 business class with 719 economy class travellers and demonstrated some interesting findings.¹³ None of the



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travellers in this study had ultrasonic or clinical evidence of venous thrombosis, and none had clinical evidence of this six months later.

Table 1. Risk factors for thrombosis in air travellers

- Past or family history of DVT (especially if patient has a factor V Leiden or prothrombin G2021A mutation)
- Venous stasis – such as significant venous insufficiency, varicose veins
- Coagulation disorders – such as thrombophilia, polycythaemia
- Recent trauma or surgery – especially leg, hip or pelvic
- Medical predisposition – obesity, smoking, older age, chronic disease (especially inflammation), malignancy
- Pregnancy and first two months postpartum, hormone replacement therapy, oral contraceptive pill
- Cabin related factors – such as cramped position, immobilisation, dehydration, hypobarism, hypoxia

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Table 2. Thrombosis prevention advice for long distance air travellers***Travellers at low to moderate risk of thrombosis**

- Plan day or night stopovers to break flight up into shorter segments
- Stand up and move around regularly
- Request a bulkhead or aisle seat
- Perform leg and calf stretching exercises every one to two hours
- Maintain adequate fluid intake – at least 2 L per 24 hours
- Restrict alcohol and caffeine to one or two glasses/cups per flight

Travellers at moderate to high risk

Follow the precautions listed above for travellers at low to moderate risk plus:

- Wear below-knee class I graduated compression stockings

Travellers at high risk

Follow the precautions for travellers at moderate to high risk plus:

- Consider an injection of low molecular weight (LMW) heparin (dalteparin [Fragmin], enoxaparin [Clexane]) before departure

Travellers at very high risk

Follow the precautions for travellers at moderate to high risk plus:

- Have an injection of LMW heparin before departure, unless already taking oral anticoagulation therapy

* This advice is, as yet, without scientific basis.

D-dimer levels, which are associated with current or ongoing thrombosis, were more likely to be elevated in those who travelled business class (12%) than in those who travelled economy class (7%), although this was not statistically significant. It is of note that the factor V Leiden mutation and the use of aspirin were associated with elevated D-dimers in this study, emphasising the needs to consider wider screening for factor V Leiden and to exercise caution in the use of aspirin.

Preventive advice

Advice for intending long distance air travellers regarding measures that may possibly prevent thrombosis is given in Table 2.

A recurrent past or family history suggests the need to exclude clotting disorders, in particular those due to factor V Leiden or prothrombin (factor II)

G2021A mutations.

Based on clinical experience regarding the reduction of DVT postsurgery, it makes sense to encourage mobilisation, regular calf exercises, adequate hydration and the avoidance of excessive alcohol and caffeine (dehydration agents) in long distance travellers. While some may think sleeping tablets may create less opportunity for mobilisation, use of these medications has not been shown to reduce the incidence of limb movements during sleep, nor have they been implicated in VTE.

The use of class I graduated compression stockings may be helpful for travellers with additional risk factors or excessive concern. While there are no data confirming the efficacy of any intervention for the reduction of death, PE or symptomatic VTE, the wearing of compression stockings on long haul flights is associated with a substantial reduction in risk of

asymptomatic DVT.¹⁴

Many practitioners may not be aware that there is currently no evidence for the use of aspirin as a means of preventing VTE, it being indicated for prevention of thrombosis in the arterial circulation, not the venous circulation. Aspirin has not been shown to be effective in preventing VTE occurring with travel and is associated with elevated level of D-dimers as well as a significantly increased rate of adverse gastrointestinal effects.^{10,13}

The British Committee for Standards in Haematology Guidelines (www.bcsghguidelines.com/pdf/venousthromb_230505.pdf) provide a structured approach to offering advice to travellers.¹⁵

Conclusion

More studies are needed to clarify the various causes of VTE but there are some preventive actions that intending long distance travellers can take. The risk of VTE on aircraft can be reduced by maintaining a high fluid intake, restricting alcohol intake, moving the feet and lower legs while seated, and getting up and moving about the cabin at regular intervals. Persons at higher risk should consult a travel health physician regarding the use of properly fitted below-knee compression stockings and medications to reduce the risk of clot formation.

An editorial in the *British Medical Journal* suggested that the evidence for VTE from air travel remains circumstantial and until sufficiently large and well designed prospective studies are completed, any advice remains without scientific basis.¹⁶ However, it makes good sense to offer all intending travellers some general preventive advice, reassuring those at low risk that their risk is low and identifying those at higher risk. **MT**

A list of references is available on request to the editorial office.

DECLARATION OF INTEREST: Dr Cohen is Medical Director, Travel Clinics Australia.

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