Case report: Stroke following an airline flight

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Airline passengers have been reported to be at risk of thromboembolic complications, including deep vein thrombosis (DVT), pulmonary embolism (PE), femoral arterial thrombosis, and sudden cardiac death. Internet and MEDLINE searches revealed only one previous medical case report of stroke occurring in association with an airline flight. Beighton and Richards described three patients who collapsed during or immediately after a flight and were subsequently diagnosed with nonhemorrhagic stroke. One had a patent foramen ovale and DVT, from which a detached clot was presumed to have occluded the brain.

Case report

The patient was a 76-year-old woman who presented to a hospital in Newfoundland with right hemiparesis and hemisensory loss without aphasia. The symptoms began a few hours after a flight from Ontario. Her history included hypertension, which was treated with enalapril. Blood pressure on admission was 190/110. Family history revealed two sisters who had suffered strokes. Results of a computed tomography scan of her head were normal. A carotid ultrasound scan showed slight atheromatous changes but no critical lesions. Her serum cholesterol level was 5.63 (low-density lipoprotein 3.25, high-density lipoprotein 1.08, triglycerides 2.87). One week later she flew back to Ontario and was admitted to a rehabilitation unit. A transesophageal echocardiogram and bubble study showed no evidence of intracardiac thrombosis or right-to-left shunt. Her hemiparesis slowly improved. She was discharged home to continue outpatient therapy.

Discussion

Stroke is a common illness, and its occurrence following an airline flight could be coincidental. A review of 149 patients with nonhemorrhagic stroke, consecutively discharged from the Freeport Rehabilitation Unit, revealed four additional patients (two men and two women, ranging in age from 40 to 75) with an association between nonhemorrhagic stroke and medium- to long-haul airline flights. Two patients had strokes within 48 hours of flight. Another patient had symptoms of vertebro-basilar insufficiency that began while on board a plane. The symptoms resolved, but a stroke with the same symptom complex occurred 2 weeks later. The final patient had a history of previous stroke, which occurred 2 days after a flight. A second stroke occurred after a long car journey. These cases suggest that the association between flying and stroke is worthy of further investigation.

The health risks associated with flying are low. The International Air Transport Association reported an in-flight death rate of about 125 deaths per billion km flown, or 25.1 deaths per million flights. Most were classified as sudden cardiac death, mainly occurring among passengers with no reported health problems. Complications might not appear for hours after a flight, however, so the incidence of events during flights underestimates the risks of flying.

Flying is known to increase risk of lower limb thromboembolism. A case-control study found...
that patients with DVT or PE were significantly more likely to have had a recent journey of 4 hours or greater (by airplane, car, or train) than controls.\textsuperscript{9} The condition of DVT, with or without associated PE, was dubbed “economy class syndrome” by Symington and Stack,\textsuperscript{2} based on the theory that tightly packed seating puts passengers at risk. It is postulated that precipitating factors include venous stasis from prolonged sitting, pressure from the aircraft seat on the back of the legs, and hemoconcentration due to diminished fluid intake and water loss in the dry atmosphere of airplane cabins.\textsuperscript{4,10}

It is generally assumed that PE results from DVT, not from generalized hypercoagulability. Only five of 15 patients with PE who developed symptoms within 4 days of a flight, however, had demonstrable venous thrombosis.\textsuperscript{10} None had any pre-existing clotting abnormalities. With the availability of newer, more sensitive measures of clotting activity, further study of the effect of airline travel on blood coagulability is warranted.

If flying increases the risk of stroke and other thromboembolic complications, what should passengers do? Common sense recommendations to prevent DVT, which might also prevent other thromboembolic complications, include drinking adequate fluids, refraining from cigarette smoking and alcohol consumption, changing position frequently, exercising the lower limbs, and getting up and moving around.\textsuperscript{10} For patients at high risk, wearing support hose\textsuperscript{11-14} or taking acetylsalicylic acid\textsuperscript{10,12,15} has been recommended. This makes empirical sense and is unlikely to cause harm, but no scientific evidence supports these recommendations.\textsuperscript{13}

**Conclusion**

A relationship between long-distance air travel and DVT has been previously demonstrated. Passengers tightly squeezed into economy class seats might be at particular risk because of cramped conditions, in addition to decreased barometric pressure and low humidity. This case report suggests that flying might also result in stroke. Given the popularity of long-distance travel among aging baby boomers and the increasing age-related risks of stroke, the relationship between thromboembolic stroke and air travel requires further study.

**Competing interests**

None declared

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**References**