Brief Report

Angle-Closure Glaucoma on Long-Haul Flights

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IMPORTANCE Unlike other modes of long-distance travel, long-haul flights delay urgent, specialist medical treatment until the destination is reached or the plane is diverted. Angle-closure glaucoma (ACG) occurring during those flights results in considerable morbidity and may cause permanent visual loss. It is preventable in patients with risk factors but may be an underrecognized and underreported phenomenon on long-haul flights.

OBSERVATION We report a case series of 3 patients with ACG that developed on long-haul flights. The patients presented to 2 ophthalmic institutions for treatment in the south of England between 2010 and 2012. All patients were female and hypermetropic, and all experienced considerable morbidity while awaiting medical treatment that was not available in flight.

CONCLUSION AND RELEVANCE Individuals with risk factors should be advised on the symptoms of ACG and the appropriate course of action should those symptoms occur. Prophylactic therapy with pilocarpine, 2%, eyedrops may be useful for individuals with risk factors who are embarking on long-haul flights. Airline personnel should be aware of ACG and encouraged to consider the value of training cabin crews to provide appropriate first-aid measures.

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We present 3 cases of angle-closure glaucoma (ACG) occurring during long-haul flights. Details of each case are provided in the **Table.** We hypothesize that this form of travel may increase the risk of ACG in people with risk factors and suggest potential reasons.

Case 1

A 68-year-old woman developed a painful left eye with blurred vision while traveling from London, England, to Los Angeles, California. On landing, the woman sought treatment and ACG was diagnosed. Medical management was successful before the woman underwent bilateral laser peripheral iridotomy (PI). She returned home with prescriptions for eyedrops, including pilocarpine nitrate, 2%; brimonidine tartrate, 2%/timolol maleate, 0.5%; travoprost, 0.004%; and brinzolamide, 1%. On examination, the left PI did not appear to be fully patent, and further laser treatment was required. Hypotensive treatment was tapered to discontinuation, and the woman underwent cataract surgery. At the time of writing, the optic discs remained healthy with full visual fields.

Case 2

A 53-year-old woman developed left ACG at the end of a flight from London to Sydney, Australia, with severe left-sided headache, blurred vision, and photophobia. She was receiving citalopram hydrobromide for depression. Previous similar episodes had been considered migrainous. She received medical treatment and bilateral PI in Australia. On her return to England, the woman's intraocular pressure was 10 mm Hg in both eyes with no treatment. Citalopram was stopped and, at the time of writing, the optic discs remained healthy with full visual fields.

Case 3

A 42-year-old woman, who had undergone bilateral PI for treatment of ACG 14 years earlier, developed recurrent right ACG with pain, blurred vision, and nausea toward the end of a flight from New York, New York, to London. The episode was controlled medically before a second right PI was performed. Ultrasonographic examination biomicroscopy demonstrated plateau iris configuration (**Figure**), and the woman underwent peripheral iridoplasty. Two weeks later, she experienced another episode of ACG that was managed medically, but it recurred despite pilocarpine, 2%, treatment. The woman underwent clear-lens extractions and, at the time of writing, had experienced no further recurrences.

Discussion

Several risk factors are recognized for ACG, including hypermetropia, short axial length, small corneal diameter, large anteroposterior lenticular diameter, age older than 60 years, fe-

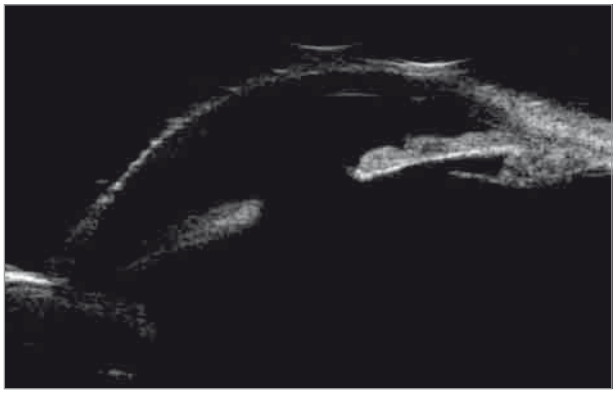
Table. Key Features of 3 Cases of ACG on Long-Haul Flights

Case and Eye	IOP, mm Hg		Gonioscopy Findings[a]	Refraction, Spherical Equivalent	Axial Length, mm	Final VA (Snellen Corrected)
	Presenting	Final				
1						
Right	Unknown	13	Bilateral narrowed angles consistent with ACG; some areas of peripheral anterior synechiae	+8.00 DS	20.03	6/6 −2 (20/20 -2)
Left (affected eye)	Unknown	13		+7.50 DS	19.95	6/6 −2 (20/20 −2)
2						
Right	Unknown	10	Bilateral narrowed angles consistent with ACG	+10.00 DS	19.72	6/6 (20/20)
Left (affected eye)	45	10		+7.50 DS	19.74	6/6 (20/20)
3						
Right (affected eye)	50	14	Bilateral plateau iris configuration	+5.25 DS	21.69	6/6 (20/20)
Left	Unknown	14		+4.50 DS	21.88	6/6 (20/20)

Abbreviations: ACG, angle-closure glaucoma; DS, diopter sphere; IOP, intraocular pressure; VA, visual acuity.

[a] Performed in England after the initial treatment.

Figure. Ultrasonographic Examination and Biomicroscopy of Case 3



Plateau iris configuration is demonstrated in the right eye.

male sex, family history, and certain ethnicities, including Inuit and East Asian.[1,2] Systemic medications have also been implicated, including citalopram, which we acknowledge as being a factor in case 2.

Although we cannot exclude the possibility of coincidence, these cases suggest an increased risk of ACG in susceptible individuals on long-haul flights. This risk could relate to extended periods of sitting upright in low-light conditions. Pupil block is believed to occur during pupillary mid-dilation,[3] a physiologic finding in dimly lit environments.[4] Angle crowding during pupil dilation may be the mechanism in case 3.

Other modes of long-distance travel may similarly increase the risk of ACG for the reasons described above. However, long-haul flights deserve special attention owing to the difficulties in obtaining treatment until the destination is reached or the plane is diverted. All of our patients required specialist ophthalmic care on arrival. This may not be possible when an individual is flying to areas with less advanced health care or language barriers.

Individuals with risk factors for ACG should be advised of the symptoms and the appropriate course of action should the symptoms occur. It is unknown whether there may be a role for prophylactic miotic eyedrops, such as pilocarpine, 2%, for individuals with risk factors who are embarking on long-haul flights. It is also unknown whether sleeping is protective because sleep induces physiologic miosis.[5,6] In addition, watching films and reading may be protective owing to accommodative miosis during these activities. All 3 of our patients were seated upright during the flights. The ACG in cases 1 and 2 occurred on night flights, and the patients were unable to sleep. Both watched films and read books, but inconsistently.

Currently, airline personnel are not trained to recognize ACG or administer treatment, and the treatment may cause adverse effects. Airline staff should be aware of ACG and consider the value of training cabin crews and having medications, such as pilocarpine, 2%, eyedrops and acetazolamide, 250-mg tablets, in cabin first-aid kits. As a safe first-aid measure, supine rather than upright positioning might help to reduce pupil block in affected passengers.

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