

Can I fly Doc?

Eustachian tube dysfunction

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Anatomy

The middle ear is within the skull and is linked to the external environment through the eustachian tube which opens into the nasopharynx. This is a narrow passage lined by respiratory mucous membrane whose wall is in part rigid and in part made up of soft tissue. In a situation like this certain adverse events may cause the wall to collapse creating a closed space within the middle ear cavity. These events include exposure of the mucous membrane to infective agents, allergens or barometric changes.

Pathophysiology

The effects of these adverse events are to cause reabsorption of nitrogen into tissue resulting from a partial pressure differential between the middle ear space and tissues. This partial pressure drop causes an effusion in the middle ear which produces retraction of the ear drum membrane (the pars tensa). Depending upon the degree of retraction, pain will be experienced.

The pain is persistent in nature and may be accompanied by a sensation of blockage in the ear. There may be a diminution of hearing as well as dizziness, if the pressure changes effect the round window membrane. This may cause secondary vertigo, nausea and vomiting.

Pathological sequelae

Several pre-flight factors need to be considered in predicting circumstances where pain may occur:

- recent colds;
- nasal congestion;
- hay fever; and
- a previous history of otitis media.

These may be factors likely to exacerbate either:

- an earlier onset of pain;
- persistence of pain; or
- result in more severe pain.

In children

It has to be noted that infants usually have poor eustachian tube function, which is exemplified clinically by recurrent episodes of otitis media in this age group. The problem is especially noticeable (and pain is particularly obvious) in the descending phase of the aircraft.

In adults

In the older patient symptoms can occur if there is a failure in the ability of the eustachian tube to passively open during swallowing and breathing. It will obviously be worse in patients who suffer from nasal congestion or allergy.

Likely pathological sequelae include:

- pain is primarily the major symptom;
- permanent hearing loss is unusual; and
- permanent dizziness or damage to the inner ear system is also extremely uncommon.

Prevention of pain

Modern commercial aircraft are not pressurised to sea level and in most flights the cabin pressure will be between 5000 and 8000 feet, therefore pressure gradients between the atmospheric pressure within the aircraft and the middle ear pressure can be significant, especially as outlined above. Treatments that have been recommended are:

- the Valsalva maneuver (which is difficult for children to perform)
- use of the Otovent
- a myringotomy.

Studies have shown that one in three children could normalise their middle ear pressures by inflating with an Otovent. Autoinflation using the Otovent is now recommended for both children and adults who have trouble during flights. In my experience, this may be aided by the use of vasoconstrictor nose drops and decongestants before flight. Other helpful manoeuvres are the use of yawning, swallowing and chewing to relieve middle ear discomfort.

In special circumstances, such as where middle ear prostheses have been inserted, patients should be advised to begin equilibration of pressure at the beginning of descent of commercial or civil aviation flight. Other specific problem areas are listed in Table 1.

Table 1. Would you let this patient fly?

Problems

1. The finding of a pink ear drum. No physical features of otitis media in terms of pain and fever, what do you do?
2. Acute otitis media treated with antibiotics. Is it safe to fly?
3. A middle ear effusion with an air fluid level.
4. Middle ear effusion, no air fluid interface.

Suggested answers

1. I would allow flight. Consider the use of pseudoephedrine.
2. Yes, providing the effusion does not have a fluid level.
3. Flight would not be allowed unless grommets were inserted. This may be needed if a particular flight was booked and it was not possible to delay the flight.
4. I would allow flight.

With regard to inner ear disturbances due to barotrauma several studies have been done by the USAF, none of which have been conclusive in terms of a direct relationship between middle ear effusion or air/fluid level and barotrauma.

The use of ventilation tubes is useful during acute otitis media episodes if flying is absolutely essential. These are also useful in episodes of chronic recurrent ear pain where conservative measures have not helped.