Case Report

Alternobaric Vertigo: A case report

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ABSTRACT

It has long been recognized that changes in ambient pressure can cause a transient disturbance of vestibular function in the absence of overt aural pathology. The vertigo is short lived although the intensity may be severe enough to produce nystagmus which impairs vision.
A case report is presented highlighting the etiological features, typical characteristics of the vertigo and the associated signs and symptoms. Special emphasis on the diagnostic investigations, treatment and prevention of this clinical condition is discussed in this case report with recommendations on the disposal of cases of alternobaric vertigo.
A relatively uncommon clinical condition of aero-medical significance with serious bearing on flight safety is presented to help recognize this condition and prevent such potentially dangerous cases going unrecognized, unreported and untreated.

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Vertigo regardless of its cause is always an undesirable experience for an aviator.
Some forms of vertigo can be considered physiologic. Vertigo resulting from angular accelerations is a necessary part of the pilot’s environment. Training and experience are required to minimize the occurrence and severity of this form of vertigo. Other forms of vertigo are pathologic e.g. labyrinthitis, benign paroxysmal positional vertigo etc. These are not an acceptable part of the aviator’s environment.

Alternobaric vertigo, or vertigo induced by a sudden alteration in the air pressure within the middle ear, is a syndrome which may represent a combination of physiologic response with a pathologic process [1]. Vertigo due to increase in the middle ear pressure appears to be more common than is generally realized.

The purpose of this presentation, is to present a case report and discuss the characteristics features of this condition and highlight the associated factors and suggest simple preventive measures.

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Case report

A 26 years old fighter pilot with 690 hrs of flying experience was referred to the medical evaluation centre IAM, IAF in Mar 1999 with complains of repeated episodes of unsteadiness and sensation of turning, on Valsalva after completion of each sortie, since January 1999. Clinical history revealed that in December 1998, while on leave, he developed features of acute rhino sinusitis, which was treated by antral washouts and routine conservative treatment.

He resumed his flying duties in January 1999 and experienced the giddiness on Valsalva. The giddiness was transient lasting for a few seconds and always followed a Valsalva and was associated with a sensation of fullness in the ear. He described each episode as a sensation of unsteadiness and turning. As the symptoms persisted even after two months, the pilot reported to the squadron M.O.

ENT evaluation showed a congested nasal mucosa with the left ear tympanic membrane being congested and sluggishly mobile on Valsalva. Hearing tests were normal. Tympanometry revealed type C curve in both ears with a negative pressure of -70 daPa in the left ear and -35 daPa in right ear. Following the middle ear pressure in the left ear was 175 daPa a rise of 245 daPa. ENG recorded 2-3 left beating nystagmus beats on Valsalva, and the other vestibular tests were normal. CT scan of the PNS revealed persistent haziness in both maxially and ethmoidal sinuses. An ear clearance run induced the same giddiness on Valsalva during descent in the chamber.

Alternobaric vertigo is the most likely etiology for his symptoms of giddiness. Tow factors probably contributed to his alternobaric vertigo. The upper respiratory tract infection causing Eustachian tube dysfunction resulted in the negative middle ear pressure in both ears. Further the difficulty in ventilating the ears resulted in the pilot performing forced Valsalva with a sudden large increase in the middle ear pressure resulting in vertigo.

Aeromedical disposal

He was further managed conservatively with antihistaminic and nasal decongestants. He was observed in a ground category.

The pilot was reevaluated after 3 months when he became asymptomatic. ENT evaluation was normal. Tympanometry revealed a negative pressure of -10 daPa in the right ear and -35 daPa in the left ear increasing to 110 daPa on Valsalva. Ear clearance run was normal. He was reflighted to fly under supervision with a qualified pilot.

Reevaluation after another 3 months revealed nothing abnormal on clinical ENT examination. Tympanometry showed an improved middle ear pressure of -10 daPa in the left ear increasing to only 60 daPa on Valsalva. Ear clearance run was normal and the pilot was reflighted to full flying duties.

Discussion

Vertigo in connection with atmospheric pressure changes in caisson workers was first recognized by Alt in 1896. Alternobaric vertigo is a relatively new term being first used by Lundgren in 1965 [2]. The incidence of alternobaric vertigo in the pilots is probably quite common. Lundgren found that 17% admitted to alternobaric vertigo on his survey of 108 pilots. Earlier Melvill Jones who coined the term pressure vertigo to this symptom complex reported that 10% of the 190 pilots he
interviewed had experienced alternobaric vertigo. Rodriguez-Lopez concluded in their discussion of two case reports that alternobaric vertigo is probably not as uncommon as previously suspected and the incidence may be on the increase [3].

The specific mechanism, which triggers a vertigo with changes in the atmospheric pressure is not clearly understood. The increase in the pressure due to failure of ventilation of the middle ear on ascent is gradual and usually not enough to produce vertigo. But in aircrafts capable of rapid rates of climb or with the sudden positive pressure created by the performance of a forceful Valsalva maneuver the increase in pressure can be sufficient to cause vestibular stimulation. Eustachian tube dysfunction secondary to an upper respiratory tract infection will require a more forceful Valsalva maneuver to clear the ears than is normally necessary. Therefore increased positive pressure in the middle ear seems to be the common denominator in the mechanism of inducing vertigo. As a rule 100-120mmHg increase in the positive pressure is required for the vestibular stimulation as demonstrated by Nylen and Karlefors (1921). In addition several experimental studies indicate a pressure differential of about 50cm water between the middle ear cavities when the vertigo develops [4, 5]

Jones considered upper respiratory tract infection an important etiological factor. This lends support to the “don’t fly with a cold” admonition. The vertigo is characteristically sudden in onset rarely lasts longer than 10-60 seconds. It is noted as nearly always occurring when there is some difficulty in clearing the ears. The vertigo could be severe enough to produce a nystagmus. It appears therefore that alternobaric vertigo introduces a hazard in flying.

The treatment of alternobaric vertigo is prevention. The practice suggested by Jones of equilibrating small pressure changes in the middle ear rather than allowing greater pressure differentials to build up is very reasonable. Avoidance of flying when plagued with common cold or any other conditions which cause nasopharyngeal congestion with difficulty in ventilating the ears is important. The knowledge that the flier is able to clear his ears only with some effort on the ground does not justify exposing him to rapid atmospheric pressure changes risking an episode of alternobaric vertigo in flight. It would therefore be safe not to refight the aircrew in a hurry following any clinical condition that causes difficulty in ventilation of ears.

The best method of prevention is education, and surely alternobaric vertigo is common enough and potentially hazardous to warrant a dedicated teaching effort by the medical officers.

Summary

A case of alternobaric vertigo has been presented to highlight the common characteristics, clinical features and importantly the prerequisite pressure changes in the middle ears to induce a vertigo due changes in the atmospheric pressure. Attention is also drawn to the probable increase in occurrence with advent of fast jet planes. The duration of vertigo though short could be enough to cause accidents especially when flying at high speeds at low altitudes [6]. The effects of alternobaric vertigo are an important reason in addition to barotraumas to mitigate against flying with any condition that threatens pressure equilibration in the middle ears.

In conclusion it is important, that all medical officers should be familiar with the signs and symptoms of alternobaric vertigo, to able to diagnose it and educate the aircrew.
References

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