

Otolaryngological Problems

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Introduction

THE field of Otolaryngology includes three specialised sense organs serving the functions of hearing, equilibrium and olfaction. The importance of normal function of all these organs for optimum performance in flying can never be disputed. The otolaryngological diseases are many and varied. They cause frequent temporary incapacitation but permanent and severe disabilities are not so common. The incidence of disability amongst aircrew due to otolaryngological causes ranges from 0.5 to 1.5% while the rejection rate of candidates for flying duties (NDA candidates) has varied between 2.25% and 4.7% over the years. The criteria for otolaryngological assessment of flying personnel and the problems experienced in such assessment are discussed below.

Ear Diseases

Of the three anatomical divisions of ear the external ear by far is the least problematic area whereas the middle and inner ears pose numerous problems.

Middle Ear

The assessment of middle ear for flying duties is based on the following criteria:-

- (i) Absence of active or inactive disease.
- (ii) Tympanic membrane is intact, mobile and firm.
- (iii) Ability to voluntarily ventilate the middle ear.
- (iv) Adequate hearing level as judged by voice tests, pure tone audiometry and tuning fork tests, where indicated.

The middle ear disorders are many and are common otolaryngological causes of unfitness for flying duties. For the purpose of assessment they can be divided into following groups:-

Suppurative Otitis Media: The suppurative otitis media gets revealed readily on account of the ear discharge, perforation anywhere on the tympanic membrane, granulations, polyp, mastoidectomy scar or cavity etc. The visible evidence of disease in these cases, whether active or inactive, makes it simple to decide against fitness for flying. Recent advances in reconstructive surgery of the middle ear have made it possible for some aircrew to return to flying duties, particularly those with central perforation, which requires a myringoplasty.

Non-Suppurative Otitis Media: This group includes acute and chronic secretory otitis media, glue ear, adhesive otitis media and tympanosclerosis.

This group has assumed importance following the advent of antibiotics, which led to the decline of suppurative diseases. These diseases usually start at younger age and are observed mainly among the candidates. The incidence in serving aircrew is not significant. Detection is helped by the abnormal appearance of tympanic membrane, impaired mobility, eustachian tube obstruction and conductive deafness. However, mild cases are liable to escape detection.

Deformities of Tympanic Membrane: In some individuals the tympanic membrane although intact, may have some of the deformities like retraction

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tion which may be generalised or local, thin scar, calcified areas and retraction pocket, which may be adherent to deeper structures. These deformities are usually the result of past suppurative or non-suppurative otitis media. They often cause problems in deciding fitness, particularly with a thin scar which may or may not withstand the rapid middle ear pressure changes in flight. Otomicroscopic examination and where possible, a decompression chamber run are very useful in deciding on these cases.

Conductive Deafness: In this group are included all those cases which are normal on clinical examination but have substandard hearing due to conductive deafness. The possible causes are otosclerosis, ossicular chain dislocation, ossicular chain fixation and some cases of secretory otitis media, adhesive otitis media and tympanosclerosis. Microsurgery can restore hearing to almost normal levels in case of otosclerosis and ossicular chain dislocation. However, considerable caution is necessary while permitting such individuals to resume flying since the rapid changes of middle ear pressure in flight can dislocate the ossicular chain or the prosthesis and can also lead to vertigo through vestibular disturbances. Only transport flying can be permitted in most of these cases.

Eustachian Tube Problems

The main problem concerning the eustachian tube is the non-availability of an ideal test to measure its functional adequacy. The most common test is the valsalva manoeuvre. The main advantage of this test is its simplicity. The chief disadvantage is that the subject, particularly a candidate, may fail to inflate ears because of incorrect technique or inexperience. Thus a negative result does not necessarily mean eustachian tube obstruction. It is not always possible to teach the technique to every subject. No entirely satisfactory test of tubal function has been found so far. Impedance audiometry techniques, however, appear to hold some promise. Presently, a decompression chamber test at varying rates of ascent or descent is the best method available, although it cannot be used routinely.

Inner Ear

Assessment of the inner ear is normally limited to functional examination of both the cochlear and vestibular organs. The cochlea is much more frequently involved in disease leading to sensori-neural hearing loss (SNHL) or the perceptive deafness. The

essential features of SNHL, which affect the aero-medical assessment are, firstly, that the disability is permanent, and secondly, that it affects the speech intelligibility which does not improve fully inspite of amplification and is likely to worsen under actual conditions of flight due to high noise levels. Therefore a new entrant with SNHL is not accepted. Assessment of serving aircrew often poses problems. The causes of SNHL which have been observed among the aircrew are as follows :-

Noise Induce Hearing Loss and Acoustic Trauma	}	Commonest cause
Head Injury		
Infectious-viral or bacterial Ototoxic Drugs Inner Ear Barotrauma	}	Isolated cases seen

The assessment of these cases is based on following criteria :-

- (i) Nature of disease - whether progressive or not.
- (ii) Normal vestibular function.
- (iii) At least 300 cm conversational voice hearing in each ear or one ear normal and the other with sub-total loss.
- (iv) Audiogram showing minimal loss for frequencies upto 3 KHz.
- (v) Adequate speech intelligibility, particularly for amplified speech against background noise.
- (vi) Flying experience.
- (vii) Executive report on hearing performance in flight assessed by competent examiners.

Vestibular System

The incidence of organic vestibular disorders is normally very small in any population group and more so in the aircrew population. Vertigo or a sense of imbalance is the main symptom, which however, is not uncommon. The possible causes of vertigo in the aircrew population are as shown:-

- (a) Otological causes :
 - (i) Wax or foreign body pressing on tympanic membrane,
 - (ii) Effusion in middle ear,

- (iii) Sudden pressure changes in middle ear or the alternobaric vertigo,
- (iv) Perilymph fistula and inner ear barotrauma,
- (v) Head injury,
- (vi) Drug toxicity,
- (vii) Viral labyrinthitis,
- (viii) Meniere's disease,
- (ix) Benign positional vertigo,
- (x) Acoustic neurinoma

(b) Non-otological causes :

- (i) Hypoxia,
- (ii) Vestibular neuronitis,
- (iii) Acute or chronic ischaemia of brain,
- (iv) C. V. S. disorders,
- (v) Epilepsy,
- (vi) Vertigo of cervical origin,
- (vii) Psychogenic vertigo.

Fitness for flying duties in these cases depends on the nature of the disease and normal vestibular function.

As compared to the conditions listed above, we are more often confronted with cases requiring vestibular function evaluation on account of spatial disorientation and air sickness. The aim is to exclude any organic pathology. During last five years, twenty cases of air sickness among experienced aircrew were referred to the Institute of Aviation Medicine. Vestibular function tests did not reveal any abnormality in all these cases. For the new entrants, there is no reliable test available to detect air sickness, if a candidate gives any, is the only useful clue available. A large variety of vestibular function tests are in use in laboratories the world over and there is no general agreement yet as regards the technique and interpretation of responses. There are few definite criteria available to decide on the hypo and hyper function of the vestibular system which makes it difficult to decide on cases of spatial disorientation and air sickness.

Nose and Para Nasal Sinuses

Nose and sinuses are frequently affected by disease but the transient and self limiting nature of the disorders does not normally cause problems in aeromedical assessment. However, where the condition becomes chronic and starts affecting flying efficiency, either by itself or by affecting other organs, a detailed evaluation becomes necessary. Such conditions are nasal allergy, nasal polyposis and chronic sinus infection. Where a cure is achieved, fitness for resuming flying can be decided after ascertaining ascent and descent tolerance in a Decompression Chamber, in addition to the usual clinical and radiological assessment. Occasionally a situation arises when the condition is not amenable to treatment or after an apparent recovery, the individual fails in the chamber test. In such cases they may have to be permanently grounded.

Throat and Larynx

Problems of throat and larynx are largely organic in nature and can be treated clinically with return to full flying duties. Chronic hypertrophic pharyngitis and chronic nonspecific laryngitis are seen frequently. Faulty vocal habits, vocal abuse, smoking and alcohol are the usual provoking factors in these cases and do not pose much problems. However, a permanent voice disorder like gross hoarseness, affecting the clarity of speech during RT communications entails grounding.

Conclusion

In conclusion it can be said that deafness is the most common problem area in otolaryngological assessment of aircrew. Decision on vestibular function state in cases of air sickness and spatial disorientation is another definite problem area. Eustachian tube malfunction also poses difficulties of assessment in some cases. There is definite scope to improve the assessment technique in these areas.