Medical Problems in Flight Cadets prior to Commencement of Flying Training - A retrospective study (1984-87)

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Forty eight flight cadets with various disabilities had reported to Institute of Aviation Medicine, IAF, Bangalore (IAM) for evaluation during 1984 to 1987. They constituted 8.61% of the total intake of 558 flight cadets to Air Force Academy during this period. Thirty two of them had medical disabilities and the rest 16 had surgical disabilities. Seventeen cases had ECG abnormality, 3 cases had suffered from viral hepatitis, 6 cases had substandard leg length and 4 cases presented with central nervous system abnormality. Among the surgical cases 4 had eye disability, 4 presented with ENT problems, 1 had dental caries, 2 cases had sciatica due to spinal deformity and 5 cases suffered from general surgical problems needing operative treatment. Evaluation at IAM resulted in rejection of 4 cases (12.5% rejection rate) from the group with medical disabilities and 7 cases (43.75% rejection rate) from the surgical group. Thirty seven cases out of 48 were thus declared fit for continuation of training including flying after evaluation at this Institute.

Keywords : Flight cadets, disability, medical, surgical.

Candidates seeking entry to Officer's training course in Army and Navy at National Defence Academy (NDA), Pune are medically evaluated in various Army and Navy Institutions and Hospitals, whereas those seeking entry to Air Force are usually medically examined at Air Force Central Medical Establishment (AF CME) in New Delhi or at Institute of Aviation Medicine (IAM) in Bangalore. Appropriate standards for uniform selection for such candidates are laid down in IAP 4303[1]. Selected candidates, after completion of basic ground training at NDA report to Air Force Academy at Hyderabad for flying training. Medical evaluations prior to commencement of flying training as well as periodically during period of flying training are carried out by local medical authorities. Those who are found to have any defect or disability are referred to IAM for specialist check up and final disposal. Such referrals during the last 4 years form the subject of this study.

Material and Methods

Flight cadets referred from Air Force Academy during the last 4 years formed the subjects of this study. Each flight cadet was subjected to detailed clinical examination including eye and ENT check up. Routine blood and urine analysis and biochemical parameters were done in all. Flight cadets with dental, surgical or orthopaedic problems were referred to concerned specialists. Those with neuropsychiatric problems were subjected to X-ray skull, X-ray cervical spine, EEG and psychometric evaluations. Flight cadets with vasovagal syncope or fainting spells were subjected to extended GTT, tilt table studies, positive acceleration stress ($+G_z$) and vestibular function evaluation.

Flight cadets with cardiac murmur or ECG abnormality were subjected to ECG (resting and DMT), Echocardiography, Holter study and stress testing. The echo study was done on Sonolyser V Model 53 M/SSL (Toshiba) both 2D and M Mode study for cardiac size, chamber dimensions, aortic, mitral, pulmonary and tricuspid valve anatomy and left ventricular function evaluation[2]. ECG was repeated after 40 mg of propranolol whenever necessary. Holter monitoring was done with Cardiodyne Cardiocassette (event recorder) and analysed for ischaemia and arrhythmia[3]. Stress tests were done upto the age related maximal heart rate using graded multistage computerised Viagraph treadmill or bicycle ergometer. Multi-channel (Mason-Likar) or bipolar (CM5) lead systems were used for on-line ECG recordings during the stress test. Standard criteria of 1.0 mm of more horizontal or down sloping ST depression at 80 msec from J-Point was used to assess ischaemia.

Results

Out of 558 flight cadets entering AFA during the last four years, 48 (8.61%)s were referred to IAM with various disabilities for further evaluation (Table-I).

Table - I Statistics of Flight Cadets referred to IAM during 1984 - 1987

Total number of Flt cadets Reporting AFA during 1984-87	Medical disabilities Ref to IAM No (%)	Surgical disabilities Ref to IAM No (%)	Total cases No (%)
558	32(5.7%)	16(2.9%)	48 (8.6%)

The medical disabilities consisted of 17 cases with ECG abnormality, 3 (0.54%) with viral hepatitis, 6 (1.06%) with substandard standing height, 2 (0.36 %) cases with substandard leg length and 4 (0.54%) cases with central nervous system disabilities (Table-II).

Table - II Medical Disabilities

S No	Disabilities	No of cases	Final Disposal	Loss of Flying training (Wks)	Total cases made unfit
A.	ECG Abnormality				
	1. Incomplete RBBB	7	A_1G_1	12	Nil
	2. Sinus Tachycardia	1	A_1G_1	—	Nil
	3. Multiple VPCs	1	A_4G_1	—	1
	4. Intermittent WPW Syndrome	1	A_4G_1	—	1
	5. Nonspecific ST-T Changes	7	A_1G_1	12	Nil
B.	Viral Hepatitis	3	A_1G_1	16	Nil
C.	Anthropometric measurements				
	1. Substandard Height	6	A_1G_1	—	Nil
	2. Substandard leg length	2	A_4G_1	—	2
D.	CNS Disabilities				
	1. Adjustment reaction	1	$A_2(P)G_1$	12	Nil
	2. Fainting Episode (once)	1	A_1G_1	12	Nil
	3. Motion Sickness	1	A_1G_1	12	Nil
	4. Headache while flying	1	A_1G_1	12	Nil
	Total	32	—	—	4 (12.5%)

In the surgical group 4 (0.72%) had eye problems, 4 (0.72%) ENT disabilities, 1 (0.18%) dental and 5 (0.90%) general surgery disabilities. Two cases (0.36%) had orthopaedic disabilities (Table-III).

Discussion

The disabilities were classified in three categories :- (1) Minor abnormalities not amounting to any disease or physical impairment and initially considered to be "within normal limits", (2) Infective disorders contacted during service training and (3) Constitutional sub-clinical abnormalities manifesting during the training period because of prolonged stress and strain. There were 31 (64.58%) flight cadets in the first

Table - III Surgical Disabilities

S No	Disabilities	No of cases	Final Disposal	Loss of Flying training (Wks)	Total cases made unfit
	Eye				
	1. Intermittent Divergent Squint BE	1	$A_4(P)G_1$	—	1
	2. Alternate Divergent Squint BE	1	$A_4(P)G_1$	—	1
	3. Myopic Astigmatism	2	$A_4(P)G_1$	—	2
B.	ENT				
	1. DNS (Right)	2	A_1G_1	12	Nil
	2. ASOM	1	A_1G_1	12	Nil
	3. CSOM (Bilateral)	1	$A_4(P)G_1$	—	1
C.	Dental Caries	1	A_1G_1	12	Nil
D	General Surgical				
	1. Acute appendicitis (Optd)	2	A_1G_1	12	Nil
	2. Inguinal Hernia (Optd)	2	A_1G_1	18	Nil
	3. Thyroglossal Cyst (Optd)	1	A_1G_1	12	Nil
E	Sciatica/Unilateral Sacralisation LV 5	2		—	?
	Total	16			7(43.75%)

group whereas 8 (16.67%) belonged to the second group who contacted infection during training and 9 (18.75%) developed manifestation of sub-clinical disabilities following strenuous training at National Defence Academy.

The cases with incomplete RBBB were examined to rule out organic heart disease like atrial septal defect. Echocardiogram was normal in all of them. Maximal stress tests in these cases were also within normal limits. All these 7 cases with incomplete RBBB were cleared to A_1G_1 after 12 weeks of follow up. The patient with multiple ventricular ectopics (VE) showed frequent unifocal VEs both during Holter recording and stress test. He was rejected for flying duties. The flight cadet with intermittent WPW syndrome showed frequent episodes of tachycardia with accelerated conduction during Holter monitoring as well as during the stress test and was rejected for flying duties. The cases with sinus tachycardia showed no abnormality during Holter monitoring and maximal stress test and was cleared to full medical catagory (A_1G_1).

Three flight cadets who suffered from viral hepatitis were cleared to A_1G_1 category after a period of follow up.

Six flight cadets found to have substandard standing height were considered still in the growing phase and hence were cleared in A_1G_1 medical category .

Among the four flight cadets with CNS disabilities, one had adjustment reaction in the form of frequent attacks of giddiness and occasional fainting attacks while undergoing aerobatic manoeuvres in the training aircraft. All investigations were normal. He was cleared to $A_2(P)G_1$ and advised to fly transport aircraft and helicopter only. Two who had solitary episodes of fainting spell in one and motion sickness in the other were found to be normal and declared fit. One case with headache during flying was fully evaluated and found to have no abnormality was cleared to A_1G_1 after a period of 12 week's follow up.

The disposals of surgical disabilities are given in Table III. The 4 cases who reported with eye disabilities including myopic astigmatism (two cases), intermittent divergent squint and alternate divergent squint were declared unfit for flying duties. Of the four ENT cases, only one case with CSOM was made unfit for flying duties. Two cases had deviated nasal septum and one case was diagnosed to have acute suppurative otitis media. These three cases were returned to A_1G_1 after treatment. One flight cadet with dental caries was treated and cleared A_1G_1 after recovery. Five flight cadets had general surgical disabilities requiring operative management and were ultimately made fit for flying in A_1G_1.

Two flight cadets who had reported for evaluation for sciatica were found to have unilateral sacralization of LV 5 and were rejected for flying duties.

Thus 4 out of 32 with medical disabilities (rejection rate = 12.5%) and 7 out of 16 with surgical disabilities (rejection rate = 43.75%) were made permanently unfit for flying duties. The overall rejection rate was 22.9% (11 out of 48 evaluated). 9 of the 11 were awarded A_4G_1 and accommodated in general duty jobs, whereas 2 (both with incomplete unilateral sacralisation of L5 vertebra) were invalided out of service.

Analysis of those disabilities which have been rejected reveal the fact that as many as 6 (4 with eye disabilities and two with orthopaedic problems) amounting to 54.55% of total rejection, should have been rejected at the initial examination itself. Two cases with substandard leg length who were made fit with waiver did not show any significant increase in their original measurement and therefore had to be made unfit for flying permanently. The two cases with ECG abnormality (multiple VPCs and intermittent WPW syndrome) had not shown these arrhythmias at the initial medical examination and developed these latent abnormalities following the stress and strain of training. These ECG abnormalities are known to deteriorate under stress and strain and precipitate serious tachyarrhythmias[4,5]. Only one case, the flight cadet with CSOM, contracted infection during training and developed sequelae compromising flight safety and therefore had to be made unfit for flying permanently.

In complete right bundle branch block (RBBB) seen in the electrocardiogram of 7 flight cadets amounts to 14.58% of 48 cases referred to IAM and 1.25% of total entry of 558 during the period of study. However, none of these cases were made unfit for flying. The I degree RBBB seen in young individuals is considered to be innocent, congenital in origin rather than due to acquired, ischaemic or other causes[5].

The non-specific ST-T changes considered as abnormal in 7 flight cadets again amounted to similar incidence as I degree RBBB. Besides, all these flight cadets with I degree RBBB as well as nonspecific ECG abnormalities had been detected to have these abnormalities during their initial medical evaluation at AFCME or at IAM and had been declared fit after complete evaluation and investigations.

This retrospective analysis of medical problems in flight cadets prior to commencement of flying training has focused attention on the following two points :-

(i) A more careful evaluation at the initial stage must be carried out to detect abnormalities or disabilities with an aim to prevent any fallout during training, and

(ii) those flight cadets with known, initially cleared and documented nonspecific abnormalities need not be referred for further investigation so as to avoid interference in the training schedule of the affected flight cadets.

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