

Accident Injuries and Flying Fitness

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Introduction

ONE of the important aspects of aircrew maintenance and flying fitness is prevention of injuries and reducing non-flying period after injury. Unfortunately accident injuries continue to take a heavy toll of highly skilled and operational manpower apart from the considerable human suffering that they cause.

Incidence

The percentage figures of invalidments and fatalities due to accident injuries among Air Force personnel are given in Table 1 below :

TABLE-1

Year	Percentage of Invalidment	Percentage of fatalities
1973	7	53
1974	8	49
1975	4	50
1976	8	50
1977	5	51

Thus it is seen from above, that deaths caused due to injuries constitute about 50% of total deaths in the serving personnel of Air Force.

Injuries sustained by the Air Force personnel due to scooter and motor-cycle accidents constitute 50% of the total injuries. Due to high cost of petrol, 2 wheeler vehicles are being used more and more by most of the Officers as a means of personal transportation. In the IAF, 132 motor-cycle and scooter accidents occurred in 1974, 137 in 1975; 153 in 1976 and 171 till 30 Sept. 1977. Motor cycle and scooter accidents account for 17.3% of all aircrew in lower medical category as compared to 9.1% due to aircraft accidents and 73.6% due to all other causes.

At present 10% officers of the flying branch are in low medical category. Out of this 35% officers are in low medical category due to injuries alone. Amongst the low medical category officers 45% of officers are in permanent low medical category, 50% of these are due to injuries.

Anatomical distribution of injuries resulting in low medical category amongst officers of flying branch are as follows :

Head Injuries	...	32%
Spinal Injuries	...	11%
Limb Injuries	...	52%
Other Injuries	...	5%

Importance of these injuries can be realised by the fact that head injuries resulting in cerebral damage, spinal injuries resulting in neurological deficit and orthopaedic injuries of the limbs resulting in shortening, deformities and loss of power in limbs are likely to result in permanent disabilities which may entail permanent unfitness for flying.

Assessment of Head Injury Cases

Our problem to-day is how soon a person with head injury can be considered normal enough to operate a sophisticated aircraft as there is a need for maintaining full physical, intellectual and emotional fitness. Subsequent improvement/deterioration in these faculties with time, make it necessary to review the cases.

Criteria for putting aircrew back to flying after head injury is based not only on the period of unconsciousness/amnesia and severity of the head injury but also on the absence of symptoms and of the residual effects of brain damage and post traumatic psychological phenomenon.

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It is necessary that the period of non-effectiveness is reduced to the minimum, compatible with safe and efficient flying. Clinical recovery does not necessarily mean psychological fitness for present day flying. Psychological fitness involves proper intellectual function, emotional stability and psychomotor abilities concerned with the skill of flying, as well as tolerance to stresses encountered in flight. The aircrew after moderate or severe head injuries are now being made to undergo simulated flying stresses in Explosive Decompression Chamber, Human Centrifuge, Disorientation Simulator and also by making them fly as second pilots or navigators for a period of time.

Assessment of spinal injuries

Spinal injury in Air Force Personnel are commonly encountered during ejections, heavy landing of aircrafts and in para landings.

It is mandatory to take X-ray of spine (A P and lateral views) after ejection from aircraft even in the absence of clinical evidence of trauma. Fortnightly X-rays after the accident are also taken upto two months if the preceding X-rays taken do not show any evidence of vertebral injury.

Individuals with stable fractures are kept off flying for three months after their discharge from hospital during which time they are asked to continue spinal extension exercises. At the end of three months, a fresh X-ray is taken and if this shows complete healing and spinal movements are free and painless, he could be put back to full flying duties. If, however, X-ray shows compression of anterior part of vertebral body to less than two third of normal and the spinal movements are still painful, he should be considered permanently unfit to fly aircraft fitted with ejection seats. In these cases it is not the number of vertebrae affected but the resultant kyphotic deformity which is important.

Disposal of cases with unstable compression fractures is decided on the merits of each case. Such cases usually require longer periods of non-flying status. They are not cleared for flying aircraft fitted with ejection seat unless the spinal movements return completely and X-rays show no Kyphotic deformity.

Cases with fracture dislocation of spine, complicated with paraplegia are evacuated by air to the spinal cord Injury Centre at Lucknow/Kirkee for

specialised treatment. Treating such cases in specialised spinal cord injury centres definitely reduces mortality and morbidity. Due to better and organised rehabilitation facilities the results are better and can be obtained in a shorter period thereby reducing the period of hospitalisation.

It is worth considering having rehabilitation centre for the Air Force personnel which is entirely oriented to aircrew care and rehabilitation with special emphasis on tasks which the aircrew are expected to perform.

Assessment of Limb Injuries

Skeletal disabilities in experienced pilots require objective assessment in the interest of conservation of trained manpower. This requires functional correlation between the disability and various elements of the task. The criteria for the assessment of fitness for flying are:

- Ability to operate relevant controls.
- Freedom from fatigue.
- Effective use of emergency controls.
- Usefulness as a crew member in ground work, activities in aircraft, passenger and casualty handling.
- Ability to escape or evacuate from an aircraft in an emergency.
- Ability to survive under adverse conditions.

Upper Limb Injuries

Functions of upper limb are related to manual control areas. When these disabilities are assessed for flying, the essential nature of motor activities required during various phases of flight has to be kept in mind. Important disabilities in upper limb are limitation of movements of elbow and shoulder joint, loss of fingers and or thumb thereby affecting the function of the hand.

The relevant points to note are thumb index grip, the anterior and lateral reach of the arm and the grasp reach for operating the seat pan firing handle. In ankylosis of elbow and shoulder joint a cockpit trial is given to pilots before final assessment is done.

In the case of subjects to be assessed for high performance fighter flying, cockpit tests are conducted

in a jet fighter aircraft after proper strapping. Performance during ground checks, vital actions before take off, checks in flight, checks after landing and operation of overhead firing handle are assessed.

Lower Limb Injuries

The disabilities in lower limbs are mainly those which involve limitation of movement at the knee joint, which affects the reach for rudder pedals. Unless proper degree of flexion is available, the ankle has to be dorsiflexed to take up the rearward movement of the pedal. The maximum possible dorsiflexion at the ankle is 70° and would permit the toe to move by 2.5" at the most. If the range of extension at the knee is limited, the leg reach as well as the ability to apply force are affected. In cases where ankle is not involved and muscle power is not affected, a minimum flexion at knee joint of 110° is considered essential. Extension capability of less than 160° seriously affects the reach especially for short pilots. It also affects the ability to apply sufficient force on the rudder pedals during asymmetric flight of a multi-engine aircraft.

Prevention of accidents

Due to stringent flight safety measures, aircraft accidents have been practically reduced to half in 1976 and one third in 1977 compared to previous years, but motor-cycle and scooter accidents still contribute half the number of injured amongst the aircrew. 75% of head injuries are due to scooter and motor

cycle accidents. Hence prevention of motor-cycle and scooter accidents deserves a special place.

While use of helmets has brought down the incidence of mortality and morbidity due to head injuries, other injuries caused by these accidents are responsible for maximum loss of manhours besides causing avoidable misery and disability to the affected personnel. It will be worthwhile to remind that merely putting the helmet is not enough, but to ensure that by proper chin strap it remains on the head at the time of accident. While it is not possible to eliminate accidents completely, these can be reduced drastically by cautious driving and observance of traffic rules. Driving of vehicles after consumption of liquor should be prohibited and injuries sustained therefrom should be treated as self-inflicted injuries. Road accidents can be reduced by proper maintenance of roads, enforcement of speed limits and proper maintenance of vehicles.

It is worthwhile considering organised transport after parties in officers' messes so that people can be dropped home safely after they have enjoyed the evening. It will be a good idea to provide organised transport for all personnel especially the aircrew to come and go back from work because the heavy rush of traffic at peak office hours accounts for quite a few accidents specially when one is not totally concentrating on driving but instead has some office worries in his head.