

ABSTRACTS FROM PAPERS

Human error (aircrew) accidents in training command during 1987-96

Wg Cdr SC Banerjee

Aircraft accidents have been one of the biggest drain on men and material in military aviation. Every year numerous aircrafts and lives of aircrew and passengers are lost in flying related accidents all over the world. The two most important causes have been 'Technical Defect' (TD) and 'Human Error' (HE). Between the two of them they have contributed to more than 80% of the aircraft accidents. With gigantic advancements being made in the technological field, the aircrafts have attained capabilities unheard of earlier. With such high performance aircrafts, man has become the weak link and the limiting factor. 40% of all the accidents are due to human error and of these 90% are due to aircrew error i.e. HE (A).

This paper discusses the Human Error (Aircrew) accidents in Training Command, IAF over a 10 year period i.e. 1987 to 1996, and analyses the underlying aetiological factors responsible for these HE(A) accidents.

Mirage accidents / incidents : 10 years of IAF experience

Sqn Ldr R. Ravi; Wg Cdr N. Rattan; Sqn Ldr PK Tyagi

Mirage-2000 is a modern ASF with distinctive avionics and engineering characteristics. Consequently, the Accidents/Incidents in such aircraft may differ from other aircraft. A total of 50 Aircraft Accidents/Incidents involving the Mirage fleet of IAF which occurred over a period of 10 years from 1989 were analyzed. Specific focus was given to the involvement of various Human Factors in the causation of Human Error Accidents/Incidents. Individual variables of the aircrew such as Flying Experience and also Environmental Characteristics were correlated with the Human Error Accidents / Incidents. The incidence of these occurrences of IAF Mirage fleet was compared with that of the other countries and the preventive measures are also discussed.

Delay in decision to eject: lessons from two recent fatal accidents

Wg Cdr Deepak Gaur

Two recent fatal aircraft accidents on the MiG 21 ac are discussed. Both involved young, inexperienced pilots who had come to operational squadrons after being declared day ops on Type 77 ac. In one accident the pilot was attempting to carry out a low speed loop at 700 kmph. When the ac stalled on the top of the loop he was aware of his situation, but did not attempt ejection despite advice from the leader, since he was wrongly convinced that he could recover the ac. In the second case, the young pilot was doing an unsupervised procedures sortie, wherein he was expected to carry out barrel rolls among other procedures. He apparently stalled the ac during a barrel roll and crashed in attempting a recovery. Ejection had not been attempted. Analysis of previous sorties revealed that the pilot was not comfortable performing barrel rolls on this ac, although he did not reveal this to his supervisors. The paper discusses the possible reasons for

the fatal delays in the decision to initiate an ejection. These include inexperience, moral conflicts in self-created situations, overconfidence and lack of reliable warning systems. It focuses on the possible problems on converting from Type 77 ac to Type 75 and type 96. It also highlights the need to carry out a survey among young fighter pilots to ascertain their comfort levels in progressing through the ops syllabi for Type 96 and Type 75 ac.

Molecular medicine for the 21st century

Padmashri Dr. G. Padmanaban

Molecular medicine has essentially come to signify therapy through biological macromolecules such as nucleic acids or proteins or their building blocks. The human and microbial genome projects have made rapid progress and have already provided valuable leads on the specific genes that can be targeted to cure a genetic disorder or fight cancers and cardiovascular disorders or protect against infectious diseases. While specific genes can be obtained in large quantities by recombinant DNA techniques, targeting of the macromolecules to specific tissues and cells and ensuring their sustained expression and activity in vivo have been the major challenges. Gene Therapy, Antisense and ribozyme therapy and Recombinant protein/DNA vaccines hold possibilities to revolutionize Medicine. There are technical and ethical issues to be tackled, but the hope of a cure for recalcitrant disorders of mankind has spurred research and clinical trials on a large scale. It is essential that this revolution benefits the poor in the developing world by making therapies effective and affordable.

Analysis of various factors leading to pilot error accidents in civil aviation

Dr. (Mrs) P Gopal

An aircraft accident may occur from one or any combination of vast number of factors. In US civil aviation 90% of all fatal accidents involve factors other than the aircraft. With this increasing proportion of mechanical reliability most accidents are attributable to 'Human Failure' or 'Pilot Error'. If human failure has occurred the whole sequence leading up to the error should be explored. The office of the 'Directorate General of Civil Aviation' (DGCA) was approached and Court/Committee reports maintained by this office were studied. The epidemiological data collected from these numerous accidents were analysed. Three (03) accidents where extraneous factors played an important role in bringing about human error are described in this paper. In these accidents pilot error was assigned as the primary cause, but other agencies induced or influenced this pilot error. From these accident analyses, it is demonstrated that so many innumerable, interlinked factors lead to pilot error. Direct and indirect relationships between pilot and other risk parameters are analysed and projected as accident causative factors. Accident investigators should explain circumstances of individual accidents and incidents in order to extract general principles to enhance air safety. This paper emphasises the importance of minor/major risk parameters and maintain proper vigilance over those possible contributors which lead to human error and crash.

Obesity & hyperlipidaemias : Emerging trends

Sqn Ldr Vipin Sharma; Dr Sarita Dara; Wg Cdr SS Panda,
Sqn Ldr Anupam Agarwal; Sqn Ldr Vasanti Vaze

The slow epidemic of hitherto uncommon non-communicable diseases is progressively engulfing the developing nations too. Obesity and Hyperlipidaemias, once considered as risk factors in Coronary Artery Disease (CAD), are today discreet clinical entities, which merit timely intervention and regular management. The epidemiology, etiology, myths associated, relative risk, therapy, Indian perspective and especial mention to our experience at IAM in evaluation and disposal of these individuals are discussed.

Rorschach analysis of personality and adjustment in airmen trainees referred for psychological assessment: A comparison with normal controls

Dr (Mrs) Catherine S. George; Mrs. C G Roopa; Col M B Pethe

Personality occupational fit is considered one of the essential requirements in any job selection procedure, however the present airmen entry selection procedures do not include personality testing. During the period 96-99 years a number of airmen trainees have been invalidated out of service during or after training due to psychological/psychiatric reasons. The objective of this study was to study whether the personality characteristics of airmen trainees who get referred for clinical assessment in psychiatry could be distinguished from trainees who do not get referred for the same.

30 airmen trainees (who were referred for psychological assessment from Dept of Psychiatry, CHAF) and a matched control group of another 30 trainees (from Jalahalli training institutes), all underwent a clinical interview and were administered the Rorschach test individually with no testing of limits by one of two trained psychologists. Responses were scored following Rapaport's (1970) method in terms of location, determinants and content, and results tabulated.

Results indicated that in the single group analysis of referred trainees, a significant number had similar aspects of personality dysfunction and maladjustment essentially pertaining to inadequate emotional control and responsivity. Statistical analysis on Davidson's (1950) variables for maladjustment was then done comparing the two groups. These findings and their implications are discussed.

Performance evaluation of pilot: A realistic approach

Sqn Ldr AD Upadhyay; Sqn Ldr S Sharma

In this paper the approach to evaluation of performance of a pilot in actual flying task is discussed. The evaluation of flying task in experimental situation has always been the major concern of any aviation medicine related research and the major draw back has always been that the task and the situation is not realistic. This paper discusses the approach to the evaluation in real flying and use

the already existing monitoring system. The paper is a result of a careful effort of trying to milk information from the ADR and CVR, find the way of temporal relation and also discussion with QFIs who are routinely involved in evaluation of pilot's performance and methods used by them.

Aircrew Fatigue in transport aircraft

Sqn Ldr Indranil Chakraborty

A study was undertaken at a transport squadron to evaluate the number of hours a set of aircrew flew for a day in different types of sorties, and total duration of time this set of aircrew remained on duty in a day. It was found that flying time for Route Transport Role (RTR) sorties was maximum. Duty time, too, was maximum in this type of sortie. Number of take-off and landing in a day was also highest in RTR sorties. Questionnaire survey amongst aircrew revealed that aircrew found RTR, Training cross country (TCC) and formation sorties highly fatiguing. Views of aircrew on various transit facilities were obtained, and airfields with best and worst transit aircrew facilities were identified.

Effect of smoking and alcohol on performance under simulated hypoxia akin to helicopter operations

Gp Capt (Mrs) P Bandopadhyay; Wg Cdr V Gopal; Sqn Ldr P Pant

High Altitude Helicopter Operations impose a severe physiological and psychological stress on the aviator. Certain psychological stress of high altitude stay tends to promote the use of alcohol and perhaps smoking among pilots operating at high altitude. 10 healthy male subjects participated in this study. Each subject underwent three runs in the altitude chamber. The first run was a control run for each subject. The second run was carried out immediately after smoking and the third run was carried out in the morning the next day after consumption of alcohol the previous night. The first set of readings were recorded at ground level to measure the performance levels, second set at 15,000 ft (20 min) and third at 18,000 ft (15 min). The subjects were exposed to the altitude mentioned above after consumption of a fixed quantity of alcohol (60 ml) the previous night and after smoking cigarette (2 cigarettes) just before the start of the run. Performance parameters were recorded by using a Flight Oriented Performance Task (FOPT) developed at IAM, IAF, Bangalore. Results of the study indicated that while the subject had smoked cigarette just before exposure to altitude, there was an increase in the psychomotor performance scores (penalty scores) over mean baseline ground level scores during simulated hypoxia runs. This deterioration in the performance level was statistically found to be significant. Changes in the performance after consumption of alcohol were found to be equivocal.

Assessment of visual field restriction (due to modification) in helicopters by a trigonometric model in field condition

Lt Col MS Butola Gp Capt KS Soodan

Most of the helicopters used in armed forces, due to its varied requirements and roles require some modification. One such modification was carried out in one of the HU in Western sector where helicopter were modified with ATGM Zyro sight and GPS for ATGM (Anti Tank Guided Missile) role.

These two modification were posing a great deal of visual field restriction. To assess the magnitude of the extent of restriction a TRIGONOMETRIC model was envisaged. With the help of this model the extent of blind zone could be forecasted for different sitting heights.

Trigonometric model in this study can accurately assess the restriction in all round peripheral (ambient) vision. In present study it is seen that in inferior quadrant of ambient vision is also restricted and reflect as a blind zone in front of the aircraft. The blind zone normally created by instrument panel increases due to installation of GPS. In vertical meridian due to GPS an aviator up to the sitting height of 84.5 cms will not be able to see the horizon and with sitting height of 85 cms the blind zone will be 343.8 mtrs in front of the aircraft. If GPS is not installed the blind zone with these sitting heights will be 22.85 mtrs and 21.45 mtrs respectively. While flying the length of blind zone will correspondingly increase.

Due to ATGM Gyro sight any aviator having sitting height more than 88 cms will not be able to see any object/aircraft flying over the horizon along the arc of 107° to 135° to pilot and 70° to 118° to the co-pilot. Aviator having sitting height more than 90 cms with blind zone beyond 70 mtrs along are subtended and this distance will decrease as per increasing sitting height.

The visual field restriction posed by these two modifications is quite significant and in order to have a good outside visual envelope aviator will be tempted to move his head frequently which may lead to disorientation.

Aeromedical Evaluation of miniature detonating cord activated canopy severance system for ground escape from LCA using an internal initiator

Wg Cdr N N Aggarwal

The Indian Light Combat Aircraft (LCA) has inflight and ground egress systems, both of which are operable through canopy severance system (CSS) through two different sets of miniature detonating cord (MDC) configurations. These can be activated both by internal and external initiators operable by the pilot and the rescuer respectively. The CSS is designed to split open the canopy from its frame on ground during static mode of the aircraft, and to obviate any delay between the operation of canopy jettisoning handle and the actual activation of the ejection seat during ground or in-flight emergency escape within the operational envelop of the aircraft. The ground egress system (GES) activates only the peripheral MDC bordering the canopy separating the entire canopy from its frame peripherally, while the inflight egress system (IES) activates either MDC of the CSS splitting the canopy into two fly away clam shell pieces. A preflight trial of the CSS of LCA was conducted using GFRP cockpit. The CSS was actuated by internal initiator on a mockup occupied by an anthropomorphic dummy (ATD) sitting on a deactivated Martin Baker IN 10 LG ejection seat,

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clad in full flying clothing and other components of Integrated life support system (ILSS). The paper discusses various aeromedical aspects including the injury potential to the pilot and the rescuer during CES through CSS on detonation of MDC.

ZSH-III helmet in an aircraft accident - A case report

Sqn Ldr S Sharma

Cranio-facial injuries sustained by the pilot in a fatal aircraft accident were corroborated with deformities in a ZSH-III helmet. This revealed major design and manufacturing lacunae. ZSH-III helmet is used by aircrew operating MiG series of aircraft except MiG 29. Earlier laboratory trials of the same helmet had reported poor crash protection qualities. This case report analyses the design defects and poor crash worthiness of ZSH-III helmet, in light of earlier findings. Necessary recommendations are made for providing adequate safety to the aircrew in a survivable accident.

Flying clothing of mirage aircrew - perceived problems and comparison with other clothing assemblies

Sqn Ldr PK Tyagi; Wg Cdr Navin Rattan; Sqn Ldr R Ravi

The Mirage aircrew use a mix of French and Indigenous flying clothing. The Anti G suits (Type 817; French cut away), Oxygen masks (Ulmer and Type 82 GM) and Helmets (Gueneau Geno Type 458) are imported from France while the overalls, the flying boots, socks, and gloves are of indigenous origin. A questionnaire survey was conducted among the Mirage pilots to determine the problems, if any, associated with use of the Mirage flying clothing. A subjective pilot observed comparison with other aircraft flying assemblies has also been studied in the same questionnaire. Thirty completed questionnaires were obtained. Most pilots were of the opinion that the zippers of Anti G suit were of poor quality as these tend to open up while pulling Gz. Although the oxygen mask is rated higher than the KM-32 mask by almost all the pilots regarding ease of breathing and flow of oxygen yet a significant number consider it to be a poor performer under G. This is because the mask tends to drag down under G and the nose strap enters the mouth thus interfering with radio transmission. Helmets were considered heavy by some pilots but were consistently rated better than MiG 21 helmets as regard to performance under Gz, all round vision and balance over head. The indigenous items viz the overalls, shoes and gloves were considered to be of poor quality by almost all the pilots.

Effect of 60° headup tilt on systolic time intervals in hypertension

P. Vijayalakshmi; P.B.V.P. Kumar Babu and Madanmohan

Systolic Time Intervals (STIs) variation during 60° Head Up Tilt (HUT) were studied in 21 essential hypertensive patients in the age group of 35-60 years and in age matched normal subjects. ECG, Phonocardiogram and carotid pulse were recorded simultaneously on polygraph (Nihon-Kohden). Electromechanical systole (QS2), Left Ventricular Ejection Time (LVET), Pre Ejection Period (PEP),

PEP/LVET ratio, Ejection Fraction (EF) and Heart Rate (HR) were measured immediately and 1,2,3,4,5 minutes after the tilt. Basal values of QS2, PEP, PEP/LVET ratio and HR were higher and LVET, EF were lower in hypertensive group. Differences were insignificant. Basal STIs variations in essential hypertension shows slight ventricular dysfunction even with treatment. 60° HUT produced significant STIs changes in control group. No significant difference was found between two groups in any parameter at any time of the tilt. During HUT, control group showed significant decrease in LVET ($p < 0.001$), prolonged PEP ($p < 0.02$), increase in PEP/LVET ratio ($p < 0.001$) and decrease in EF ($p < 0.001$). QS2 decreased insignificantly. HUT did not produce significant rise in HR in both the groups. Changes in STIs and in HR can be explained on the basis of age related decline in autonomic nervous system responses. Vagal responses were predominantly affected than sympathetic.

The influence of gestational diabetes mellitus on foetal weight

Dr. K.J. Vedavathi; Prof. Dr. H.B. Veeranna

This work was on gestational diabetes, that is diabetes appearing for the first time in pregnancy. Poorly controlled diabetes cause problems to mother and baby like reduced fertility in women, early abortions, congenital anomalies, intrauterine growth retardation and macrosomia (big baby). Serial ultra sonograms of 30 patients with gestational diabetes mellitus were compared with 30 patients in control group. They were in the age group of 18-34 years and at 28-40 weeks. Gestational diabetes mellitus patients were diagnosed diabetes during period of pregnancy by measurement of plasma blood sugar and serial ultra sonogram in I, II and III trimesters. Ultrasound measurement of fetal head circumference and abdominal circumference were obtained for foetuses of diabetic mothers. Following delivery, neonatal birth weights were obtained and recorded. Accuracy in prediction of weight was assessed by Dr. Woo's formula. If birth weight of the baby was more than 3500-4000 gms it was considered macrosomia. Statistically all parameters were found to be significant. This study concludes that screening of all pregnant women must be done as early as possible to prevent neonatal and maternal complications. Regular monitoring of blood glucose levels and ultrasound estimation of foetal weight in I, II and III trimesters should be done to prevent macrosomia.

A study to establish normative contrast sensitivity data in school children (CSF - Contrast Sensitivity Function)

Dr. Sharan Singh; Dr. H.B. Veeranna

Contrast sensitivity measures the least amount of contrast needed to detect a visual stimulus and gives a more complete quantization of patients visual capabilities. The current gold standard in the assessment of vision, visual acuity, provides only a limited amount of information obtained under artificial conditions.

Contrast sensitivity testing measures range of visual performance under real life conditions and enables the clinician to diagnose selective deficits in visual processing at an earlier stage than is possible with conventional testing methods. In many instances such as amblyopia, neuro-ophthalmology, retinal disorders, anterior segment diseases and glaucoma, losses in contrast sensitivity were detected when visual acuity was normal.

This study was undertaken to establish normal values for CSF in normal school children between 5-12 years of age and to ascertain at what age children attain adult values of CSF.

Contrast sensitivity was tested using Bailey - Lovie (new version - 1988) charts. From this study it was found that the CSF of children gradually increased with age to reach adult values (VAR scoring - HC - 100, LC - 100, Log Mar scoring - HC - 0, LC - 0) at 9-10 years of age. Adult values of low contrast were reached only at 12 years of age. Statistically significant differences between males and females were not found. Binocular performance was always better than unocular.

Effect of ciprofloxacin on specific immune response in rabbits

K. Jayakumar; Honnegowda, G. Krishnappa, K.N.V. Sastry, K. Narayana and Shiva Kumar

The effect of ciprofloxacin on specific immune response was studied in rabbits. New Zealand White rabbits were injected with ciprofloxacin 10 mg/kg body weight twice daily intravenously for 4 days. A known antigen was administered as a single dose on the first day to the treatment group. The control group received only the antigen. Various parameters were studied at weekly intervals till 42nd day. The parameters studied were immunoglobulin concentration measured by standard tube agglutination test, total immunoglobulin concentration, total serum protein concentration, total leukocyte count, lymphocyte count, phagocytic index and skin thickness in DNCB skin sensitivity test. The results of control and treatment groups did not differ significantly. It was concluded that at the dose and duration used, ciprofloxacin did not adversely affect the immune response in rabbits.

Effects of hyperbaric oxygen on haematological and biochemical parameters

Sqn Ldr SK Gupta Wg Cdr AK Sharma

There has been an immense increase in the use of hyperbaric oxygen for therapeutic purposes in past three-four decades. Its wide use in treatment of various clinical conditions has been accepted and debated too, owing to its properties and toxic manifestations. At cellular levels increased Oxygen tension results in formation of oxide radicals. It affects cellular metabolism due to inactivation of certain enzymes, causes lipid peroxidation, inactivates membrane transport and may even lead to cell destruction. This can lead to alteration of Haematological and Biochemical Parameters in an individual receiving Hyperbaric Oxygen therapy (HBOT).

Present study is aimed to find out the extent of changes in Haematological and Biochemical parameters in subjects receiving HBOT. Fifteen cases comprising of seven non diabetic (n=7) and eight diabetic (n=8), referred to IAM for HBOT, were taken for study. All the cases were exposed to an oxygen pressure of 2.5 ATA for 90 min every day. Eighteen such sittings were given to each individual. Each individual served as his own control. Pre and post HBOT, Haematological and Biochemical investigations reports were then compared in each group.

Findings revealed a significant fall in reticulocyte and monocyte counts in diabetic group. There was significant decrease in neutrophils in both diabetic and non diabetic groups. Biochemical investigation carried out, showed a significant fall in blood glucose levels in both the groups and

significant increase in HDL levels in non diabetic groups. Rest of the Haematological and Bio-chemical parameters showed no significant changes.

The paper deals with the details of this study and recommendations raised on the basis of it.

Hyperbaric oxygen therapy in sudden deafness

Wg Cdr V Gopal

HBO (hyperbaric oxygen) therapy is used as an adjunct in therapy of wide variety of conditions. The use of HBO therapy in sudden deafness of sensori-neural aetiology is well documented. Between January 98 and July 99, eleven (11) individuals with sudden onset deafness of differing aetiology; were referred to the Department of Hyperbaric Medicine at IAM IAF Bangalore. The treatment schedule in all the four cases was the same i.e. 2.5 ATA x 90 minutes for 5 days a week. The efficacy of therapy in each case, highlighting the difference in response based on aetiology, is discussed. An attempt is made to identify the factors associated with good response.

Life style modification in disease prevention

Wg Cdr N Bhalla

In today's scenario of rapid urbanisation, bad nutritional habits, increased smoking and decreased physical activity are leading to an epidemic of cardiovascular disease in our country. Cardiovascular disease is poised to become the number one cause of death in India within the first quarter of the next century. Urgent life style changes are needed to be made to reduce the impact of this epidemic. Lessons can be learnt from the Western experience who have successfully reduced cardiovascular mortality by implementing life style changes through public health schemes and education.

Management of schizophrenia

Wg Cdr Alok Pandey

Schizophrenia is a complex heterogenous group of syndrome which poses many challenges to the clinician. A sizeable percentage often land up in chronicity leading to social and functional invalidment. Though the understanding of this enigmatic condition is far from clear, new and powerful drugs are now available to contain it. The paper discusses some of these drugs and other related issues in the management of schizophrenia.

Acute respiratory distress

Lt Col PK Dandona

Acute respiratory distress syndrome is a well defined clinical entity seen in an acute setting in intensive care unit. It is an unlikely presentation at Sick Quarters or MI Rooms. It has been de-

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Decided to discuss the conditions of acute respiratory distress presenting at the Sick Quarter level. Respiratory distress is a condition in which the patient becomes aware of his respiration. Causes for respiratory distress may be respiratory or non respiratory. Respiratory causes may be involving upper respiratory system e.g. Foreign body, angioneurotic oedema or diphtheria. Their management involves relief of obstruction. In extreme urgent situation, a tracheostomy may be performed and if that is not possible oxygen may be delivered through an angiocath inserted in to trachea through crico thyroid membrane.

Respiratory causes are Acute Bronchial Asthma, Pneumothorax especially tension Pneumothorax, Pleural effusion, Pneumonia, Acute Pulmonary infarction, COPD, Intestinal lung disease and Acute respiratory distress syndrome. Emergency management of all these conditions will be discussed. CVS causes of respiratory distress are acute left ventricular failure and angina pectoris.

Differential diagnosis and emergency management of these conditions will be discussed.

Management of haematuria and other urological emergencies

Wg Cdr DP Joshi

Urological emergencies are met with commonly in day-to-day medical practice in the periphery. Some of these emergencies can be easily handled in the peripheral medical setup, others require evaluation at a tertiary centre. Recognition and timely intervention in most of these emergencies is essential to conserve renal function and avoid distress to the patient. In the order of incidence, the common emergencies, namely haematuria, acute retention of urine, ureteric colic trauma and testicular torsion are discussed in this paper.

Ocular trauma and its management

Lt Col KN Jha

Ocular trauma accounts for almost a fifth of all the cases of blindness. As a result all cases of ocular trauma, both trivial looking and severe, need early attention. In addition there is a need not only to emphasise but to ensure suitable preventive measures at every stage.

It is in this backdrop that the present topic will briefly cover the settings of occurrence, nature and primary management of ocular trauma of common occurrence. In addition a few important recent advances in the field of management of ocular trauma will also be highlighted.

Management of head injury

Lt Col PK Sahoo

Head injury contributes to one of the major causes of morbidity and mortality and one of the most difficult and challenging problems facing the surgeons and neuro surgeons.

Injury results in primary brain damage (due to intracranial haematoma, diffuse axonal injury).

which is very often compounded by secondary factors (hypoxia, ischaemia, cerebral oedema, raised ICP and seizures).

Approach to head injury patients is in the form of management of polytrauma. The aim of management is simultaneous diagnosis and resuscitation, prevent or limit secondary brain injury and recognise and stabilise associated injuries.

After ensuring airway, breathing and circulation (A,B,C) disability detection (D) i.e. neurological evaluation is done using GCS (Glasgow Coma Scale) followed by exposure and examination (E) to find out all associated injuries. CT (Computerised Tomography Scan) is the mainstay of decision making process. Surgery is indicated for intracranial haematoma, brain contusion and compound head injuries. Exploratory burr holes long held sacrosanct, are often inadequate.

Medical management includes measures to combat raised ICP, anticonvulsants, antibiotics and management of airway. Outcome depends on multiple factors and ranges from no deficit to persistent vegetative state.

Both primary head injury and secondary brain injuries are preventable.

Management of sudden deafness (sensorineural hearing loss)

Wg Cdr VM Rao

Sudden hearing loss is a symptom in search of diagnosis. The incidence is estimated at one case per 5,000–10,000 population per year. The specific causes of deafness may lie either in cochlea or retrocochlear auditory pathway and the incidence is statistically no greater than chance. The majority of sudden deafness cases fall under Idiopathic sudden sensorineural hearing loss where the cause may be viral or vascular and the site may be cochlea or retrocochlear pathway. Sudden deafness is a medical emergency where treatment and diagnosis of specific cause if any are instituted simultaneously. Endeavour is made to investigate the cause and site of deafness i.e., cochlea or retrocochlear pathway and treatment is instituted accordingly. The only therapy that has proven to be effective in Idiopathic sudden deafness is administration of corticosteroids as soon after the onset of the symptoms as possible over a variety of agents designed to improve cochlear circulation and oxygenation (HBO therapy) which includes carbogen gas (5% CO₂ + 95% O₂) inhalation, vasodilators, anti coagulants, anti platelet agents and plasma expanders. The frequent spontaneous recovery of hearing to normal or near normal levels makes evaluation of any form of therapy for sudden deafness very difficult.