

Head injury : Psychological aspects

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Sixty eight head injury (HI) cases underwent psychometric evaluation at Institute of Aerospace Medicine, IAF, Bangalore during eleven years period (1985-1995). Of them 23 (33.82%) cases showed psychological syndrome. 10 such syndromes (37.04%) were identified out of 27 head injured aircrew in the series. Progression through review of 28 HI cases inclusive of 17 aircrew revealed 12 incidences of psychological syndrome initially, 6 became syndrome free and returned to premorbid expectations on review. There remained residual disability in 4 cases and in 2 cases, there was no improvement even after 3 years. Implications of the findings are discussed.

Keywords: Aircrew evaluation, psychological syndromes, premorbid expectation, recovery pattern.

Head injury, because of involvement of brain, assumes utmost importance. It might possibly lead to sensory or motor deficit, cognitive and/or emotional disorders as well as traumatic epilepsy [1]. Obviously, this renders the assessment of recovery increasingly difficult. Yet, we must know how neurological condition has affected the individual patient. Thus, psychological examination becomes an integral part of neurological examination. A systematic and periodic examination of patient's mental functions is valuable in following the progress of patients suffering from numerous neurological conditions where mental symptoms are prominent. The understanding as to how neurological conditions affected the individual also forms the basis for medical management advice and rehabilitation [2].

The study was undertaken to have an insight into the magnitude of the psychological aspects associated with head injury cases irrespective of severity whether based on Glasgow Coma Scale [3] or post traumatic amnesia (PTA) [4] or both as no simple relation between PTA and severity of defect

is expected [2] and also a good recovery does not necessarily indicate mild injury as Beers [5] emphasises that it is not how hard one is hit, but the consequences of injury that are important.

Material and methods

Subjects: Sixty eight head injury cases were referred for psychometric evaluation at IAM during the eleven year period Jan 1985 - Dec 1995. The yearwise breakdown of these cases is given in Table 1. They belonged to the three services (Army, Navy including Coast Guard and Air Force) as well as included five pilot aspirants (Service, n=3; Civil, n=2) and a son of an airman. Of these, 28 cases were evaluated more than once (twice, n=7; thrice, n=9; four times, n=5; five times, n=4; six times, n=3) as they were referred for recategorisation.

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Excepting one female civil pilot aspirant all are males. Their age distribution is shown in Table 2.

Out of the total number of head injury cases evaluated, 27 were aircrew. Servicewise breakdown, age and experience are shown in Table 3, 4 and 5.

Table 1. Yearwise breakdown of head injury cases

Year	Number of cases
1985	12
1986	11
1987	4
1988	5
1989	3
1990	2
1991	2
1992	7
1993	7
1994	5
1995	10
Total	68

Table 2. Age distribution

Age (yrs)	Number of cases
Below 20	2
20 - 30	34
30 - 40	16
41 - 50	14
Above 50	2
Total	68

Table 3. Service-wise distribution of head injured aircrew

Service	Number
Air Force	15
Navy	10
Coast Guard	02
Total	27

Table 4. Age distribution of head injured aircrew

Age (yrs)	Number of cases
20 - 30	14
31 - 35	5
36 - 40	4
41 - 50	4
Total	27

Table 5. Experience of head injured aircrew

Experience (yrs)	Number
0 - 5	5
6 - 10	12
11 - 20	7
21 - 30	3
Total	27

Methodology: All the head injured cases reported for psychological assessment during the eleven year period were thoroughly evaluated based on the clinical requirement after preliminary conversation covering the patient's neurological history and perceived psychological symptoms [6]. Relevant investigations like general intellectual capacity, memory, visuo spatial analysis and visuo motor integration, confirmation of gross impairment, personality traits, important phases of personality and clinical classification were done. The test generally used are: Standard Progressive Matrices, Advanced Progressive Matrices, Coloured Progressive Matrices, Bhatia's Battery of Performance Tests, Immediate Memory Scale, Wechsler Memory Scale, Koh's Block Design, Bender-Gestalt Test, 16 Personality Factor Test, Minnesota Multiphasic Personality Inventory, Multiphasic Personality Questionnaire, Eysenck's Personality Inventory and Rorschach Ink-holt test wherever indicated.

Results and discussion

Out of the total 68 head injured cases evaluated

during the period 1985 to 1995, 23 cases (i.e., 33.82%) were found to be psychologically affected in some way or the other. Clinical disability/syndrome pattern is presented in Table 6. Ten such syndromes (i.e., 37.04%) were identified on initial evaluation of 27 head injured aircrew (Table 7) already included in Table 6.

An examination of both the Table 6 and 7 shows that majority of the syndromes are akin to post concussional syndrome as delineated in ICD-10[7] viz., impairment of memory, low stress tolerance, emotional excitement, feeling of depression or anxiety.

Table 6. Incidences of psychological disability/syndrome in head injury (n=23)

Disability/syndrome	Number	%
Intellectual impairment	5	21.74
Memory deficit	1	4.35
Constructional apraxia	2	8.69
Impaired visuo spatial analysis & visuo motor integration	2	8.69
Memory deficit and impaired visuo spatial analysis & visuo motor integration	3	13.04
Anxiety	1	4.35
Impaired visuo spatial analysis & visuo motor integration plus anxiety	1	4.35
Emotional instability with anxiety	1	4.35
Emotional instability	1	4.35
Anxiety and low stress tolerance	1	4.35
Emotional instability, anxiety plus impaired visuo spatial analysis & visuo motor integration	2	8.69
Emotional excitement with overactivity	1	4.35
Feeling of depression, memory deficit and impaired visuo spatial analysis & visuo motor integration	1	4.35
Emotional instability, memory deficit and impaired visuo spatial analysis & visuo motor integration	1	4.35
Total	23	100.00

Table 7. Incidences of psychological disability/syndrome in head injured aircrew (n=10)

Disability/syndrome	Number	%
Memory deficit	1	10.00
Constructional apraxia	1	10.00
Impaired visuo spatial analysis & visuo motor integration	2	20.00
Memory deficit and impaired visuo spatial analysis & visuo motor integration	1	10.00
Emotional instability with anxiety	1	10.00
Impaired visuo spatial analysis and visuo motor integration plus anxiety	1	10.00
Emotional instability, anxiety plus impaired visuospatial analysis & visuo motor integration	1	10.00
Feeling of depression, memory deficit and impaired visuo spatial analysis & visuo motor integration	1	10.00
Emotional instability, memory deficit and impaired visuo spatial analysis & visuo motor integration	1	10.00
Total	10	100.00

**Table 8. Progression through reviews: Head injury cases
I Subjects showing improvement on reviews**

Subject No.	Intellectual functioning (IF)		Memory (M)		Visuo-spatial analysis & Visuo-motor integration (VS & VM)		Emotional functions (EF)		Remarks
	Initial	On review	Initial	On review	Initial	On review	Initial	On review	
*1	S	S	AA	S	BA	BA	--	--	Improvement in M
*2	AA	AA	BA	HA	BA	BA	Depressive feeling	Normal	Improvement in IF
*3	AA	AA	A	A	BA	A	--	--	Improvement in VS & VM
*4	A	A	AA	S	BA	BA	Normal	Normal	Improvement in M
5	S	S	AA	S	A	A	"	"	"
*6	Intellectually Impaired (II)	II	LA	LA	Poor	BA	--	--	Improvement in VS & VM
7	S	S	S	S	LA	AA	Normal	Normal	"
8	S	S	AA	S	AA	AA	"	"	Improvement in M
9	S	S	S	S	AA	S	"	"	Improvement in VS & VM
*10	S	S	S	S	A	AA	Emotional instability & high anxiety (EI & HA)	Normal	Improvement in VS & VM and EF
11	S	S	S	S	A	AA	--	--	Improvement in VS & VM
*12	S	S	AA	S	BA	AA	Normal	Normal	Improvement in M, VS & VM
*13	AA	AA	AA	AA	BA	HA	EI & HA	"	Improvement in VS & VM and EF
*14	S	S	A	AA	BA	A	--	--	Improvement in VS & VM
*15	AA	AA	AA	AA	BA	HA	Normal	Normal	Improvement in VS & VM
16	S	S	AA	AA	A	AA	--	--	Improvement in VS & VM

* - Subjects showing psychological syndrome on initial evaluation. S - Superior, AA-Above Average; HA-High Average; A-Average; LA-Low Average; BA-Below Average

**Table 8. Progression through reviews: Head injury cases
II Subjects showing no improvement on review**

Subject No.	Intellectual functioning (IF)		Memory (M)		Visuo-spatial analysis & Visuo-motor integration (VS & VM)		Emotional functions (EF)	
	Initial	Onreview	Initial	Onreview	Initial	Onreview	Initial	Onreview
1	AA	AA	A	A	A	A	-	-
2	S	S	AA	AA	A	A	Normal	Normal
3	S	S	AA	AA	A	A	-	-
4	S	S	AA	AA	AA	AA	Normal	Normal
*5	S	S	AA	AA	BA	BA	Normal	Normal
6	S	S	HA	HA	HA	HA	Normal	Normal
7	S	S	AA	AA	A	A	-	-
8	AA	AA	S	S	AA	AA	-	-
9	S	S	AA	AA	AA	AA	Normal	Normal
10	S	S	AA	AA	AA	AA	Normal	Normal
11	S	S	AA	AA	A	A	Normal	Normal
*12	S	S	BA	BA	A	A	Normal	Normal

* - Subjects showing psychological syndrome on initial evaluation; S - Superior; AA - Above Average; HA - High Average; A - Average; LA - Low Average; BA - Below Average

Luria [8] considers that the frontal lobes, being at the apex of brain's hierarchy, have a pervasive influence on planning and problem solving capacity of an individual. Intellectual impairment is noticed in 5 (21.74%) of the disability incidences in head injury cases. Hence, it is reasonably conjectured that frontal lobes are affected in these cases resulting in such impairment.

Constructional apraxia evidenced from difficulty in putting together parts to make a whole [9] was noticed in two head injured cases of which one was aircrew.

Coming to progression through reviews, of the total 28 head injury review cases 12 were with psychological syndrome initially (Table 8). 4 such incidences were encountered in a total of 17 head injured aircrew cases (Table 9) sifted out of assortment of all the review cases.

Table 8 reveals that there was a perceptible improvement in one or more psychological functions

in 16 out of 28 review cases. Of 12 incidences of psychological syndrome 6 became free of disability/syndrome on review between 9 months and 2 years 6 months. There remained residual disability in 4 cases, despite showing improvement in one or more psychological functions. In remaining 2 cases there was no improvement. Considering review cases devoid of syndromes, improvement in 6 cases makes it apparent that their performance returned to the level of premorbid expectations in the areas where they performed comparatively low initially. There was no change in the psychological functions evaluated in remaining 10 cases, presumably due to preservation of such functions at a level more or less consonant with premorbid expectations.

When review of head injured aircrew is considered separately (Table 9), it is evident that 10 showed distinct improvement in one or more areas. Out of 4 aircrews initially with incidences of disability/syndrome, 3 became syndrome free after review, earliest in 9 months and latest in 2 years. One continued with visuo-spatial analysis and visuo-motor inte-

Table 9. Progression through reviews: Head injured aircrews
I Subjects showing improvement on reviews

Subject No	Intellectual functioning (IF)		Memory (M)		Visuo-spatial analysis & Visuo-motor integration (VS & VM)		Emotional functions (EF)		Remarks
	Initial	Onreview	Initial	Onreview	Initial	Onreview	Initial	Onreview	
*1	AA	AA	BA	HA	BA	BA	Depressive feeling	Normal	Improvement in M & EF
2	S	S	AA	S	A	A	Normal	Normal	Improvement in M
3	S	S	S	S	LA	AA	"	"	Improvement in VS & VM
4	S	S	AA	S	AA	AA	--	--	Improvement in M
*5	S	S	S	S	AA	S	Emotional instability & high anxiety	Normal	Improvement in VS & VM and EF
6	S	S	AA	S	A	A	--	--	Improvement in M
7	S	S	S	S	A	AA	--	--	Improvement in VS & VM
*8	AA	AA	AA	AA	BA	HA	Normal	Normal	"
*9	S	S	S	S	AA	S	Emotional instability & high anxiety	Normal	Improvement in VS & VM and EF
10	S	S	AA	AA	A	AA	--	--	Improvement in VS & VM

II Subjects showing no improvement on review

Subject No	Intellectual functioning (IF)		Memory (M)		Visuo-spatial analysis & Visuo-motor integration (VS & VM)		Emotional functions (EF)	
	Initial	Onreview	Initial	Onreview	Initial	Onreview	Initial	Onreview
1	S	S	AA	AA	A	A	--	--
2	S	S	AA	AA	AA	AA	Normal	Normal
3	S	S	AA	AA	AV	AV	--	--
4	AA	AA	S	S	AA	AA	Normal	Normal
5	S	S	AA	AA	AA	AA	"	"
6	S	S	AA	AA	HA	HA	"	"
7	S	S	AA	AA	AV	AV	"	"

* - Subjects showing psychological syndrome on initial evaluation; S - Superior; AA-Above Average; HA High Average; A-Average; LA-Low Average; BA-Below Average

gration deficit, despite improvement in memory and becoming normal on emotional front.

Follow-up studies on head injury are not many. Denker [10] reported the persistence of various neuropsychological symptoms in approximately 33% of the cases for more than one year and in about 15% of all cases after 3 years. Follow up of 424 cases of minor head trauma by Rimel, et al [11] at three months showed persistent cognitive deficit in 59% of the cases. The present study indicated that 33.82% of the total head injured cases had psychological deficit on initial assessment. When aircrew are considered separately incidences of such syndrome rise to 37.04%. Also psychological symptoms persisted in 6 out of 28 review cases (21.43%). In case of 17 aircrew review cases, 1 (i.e., 5.88%) continued with some psychological deficit or other. Incidentally, the time gap between the dates of injury and reporting at IAM for initial evaluation varied from 19 days to 9 months; it being 6 months in majority of the cases. Thus, it is not surprising that the present findings regarding incidences and persistence of psychological syndromes in head injury more or less concur with those of Denker [10].

Needless to say that head injured cases should be referred to the nearest available psychological evaluation facility at the earliest to get a clear picture of prominence and pattern of associated mental symptoms as it might form the basis of medical management advice. Also considering the magnitude of psychological aspects associated with head injury and the recovery pattern, it is felt that periodic psychological evaluation till recovery should continue to be an integral part of medical evaluation.

Conclusion

The magnitude of psychological aspects associated with head injury is much perceptible. The useful-

ness of psychological evaluation in having an insight into how head injury could affect the individual is evident. The study also reveals the pattern of psychological recovery.

References

1. Vogel Mark S. An overview of head trauma for the primary care practitioner: etiology, diagnosis and consequences of head trauma. *J American Optometric Association*, 1992; 63(8): 537-41.
2. Walsh Kevin. *Neuropsychology - a clinical approach* (2nd ed). London: Churchill Livingstone; 1987. 332-91.
3. Teasdale G., Jennet B. Assessment of coma and impaired consciousness: a practical scale. *Lancet*, 1974; 2: 81-4.
4. Annala I, Fontary L, Buggs M, Newcombe F, Ratcliff G, Thomas C. Measuring the duration of post traumatic amnesia. *J Neurology, Neurosurgery and Psychiatry*, 1980; 43: 377-79.
5. Beers Sue R. Cognitive effects of mild head injury in children and adolescents. *Neuropsychology Reviews*, 1992; 3(4): 281-320.
6. Mc Reynolds Paul ed. *Advances in psychological assessment. Vol. 5*. London: Jassay-Buss Publisher; 1981: 194-5.
7. WHO. *The ICD - 10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines*. Madras: Oxford University Press; 1994: 67.
8. Luria AR. *The working brain*; London: the Penguin Press; 1973: 78-80.
9. Ben-Nishay J, Diller L., Mandelberg I, Gordon W, Gerstman I.J. Similarities and differences in block design performance between older normal and brain injured persons: a task analysis. *J Abnormal Psychol*, 1971; 78: 17-25.
10. Denker PG. The post concussion syndrome: Prognosis and evaluation of organic factors. *New York State J Med*, 1944; 41: 379-84.
11. Rimel RW, Giordano B, Barth JT, et al. Disability caused by minor head injury. *Neurosurgery*, 1981; 9: 221-8.