

PSYCHOLOGICAL TESTS AS AIDS TO DIAGNOSIS IN NEUROLOGY

(A case study)

Sqn Ldr. K. N. KOTHANETH

Psychological Research Wing.

In all neurological cases, testing of the intellectual functions is of prime importance. Ordinarily the common clinical tests employed indicate roughly the state of the sensorium. It is only rarely that intelligence tests as such are administered to a patient. Even if so administered, unless the previous level of intelligence of the individual is known, a deterioration, if it is only slight, cannot be measured. However, electroencephalographic records can show the presence of a lesion as well as localise it, even though the lesion is minimal and not detectable by clinical tests alone.

In a study of an Air Force pilot who suffered from a head injury it was seen that during the performance of some psychological tests it was possible to conclude that there was some minimal residual damage to the brain even though there was no clinical evidence to show it. In this instance it was possible even to fairly localise the lesion. These findings were later confirmed by an E.E.G.

Case History

Pilot Officer 'S' was involved in a flying accident in a jet aircraft in March 1956. Besides other injuries he sustained a "closed head injury". He was hospitalized in a military Hospital. On admission he was unconscious and he remained in a state of semi-consciousness, responding only to painful stimuli, for about three to four days. A fissured fracture of the left parietal bone and also of the left orbital plate were found. Neurological examination revealed a mild palsy, of the pyramidal type, in the entire left half of the body including the face.

The patient recovered gradually, progressing steadily. He was ultimately discharged from the hospital after 41 days. On discharge, clinically, he was free from all signs or symptoms referable to head injury. He proceeded on eight weeks sick leave.

On expiry of leave he was called up before a medical board to assess his fitness to return to flying duties. He had no complaints whatsoever. He underwent a neurological examination, the only abnormality detected being a nystagmus on looking to the extreme right. Ophthalmologically a nystagmus on extreme lateral deviation both sides was detectable (This is observed in many normal subjects and by itself is not considered pathological). There was no other abnormality detected. He was then referred to a psychiatrist. Clinically, there was no evidence of any psychiatric abnormality. There was no evidence of any speech disorder, apraxia or any type of agnosia.

At this stage he was given two intelligence tests, namely, the Drawing Test of Intelligence (P.R.W. No. 1 and the verbal Test of Intelligence P.R.W. No. 2). It is to be

pointed out here that the officer had done the same tests at the Selection Board while joining the Air Force in August 1953 and the score sheet was available for reference. By comparing data, slight degrees of intellectual impairment could be accurately assessed.

While doing the tests the officer appeared confident and showed a sense of familiarity. In the Verbal Test of Intelligence he scored slightly better than the last time which is generally the case when a test is administered a second time. In the Drawing Test of Intelligence (PRW Test No. 1) the officer appeared to have grasped the situation quickly and in fact completed the test somewhat quicker than the previous time (again as expected) but on scoring, it was found that he had fared very poorly as compared to the last time. His score was only six as opposed to the previous sixteen. It was also seen that the officer did the practice test correctly as well as the simple and easy ones. But when he came to the complicated ones which involved memorising four or five patterns and also visually manipulating patterns to get the correct solution, he went wrong invariably. It was concluded that there was a definite impairment in the field of visual memory and visual manipulation. This in turn suggested damage to the visual "Psychic Area" or its association fibres.

An E.E.G. was taken on 20th July, 1956 and the report is as follows:—

"The dominant activity in the post-central area is an alpha rhythm of 9-10 C/S. It is bilaterally symmetrical, spreads forward equally and responds to eye opening and eye closing.

Slow activity of 6-7 C/S (theta) is seen in the left temporo-parietal area with occasional out-bursts of Beta activity. Occasional sharp waves and spikes are seen on the right side (right temporo-parietal area). Delta activity of two cycles per second appears after over breathing in the left temporal area with occasional theta waves (4-5 cycles per second) on the right side.

The record is abnormal and is consistent with a recent left sided head injury with a contracoup effect."

In view of the above findings the officer was declared unfit to resume flying duties for the time. He was employed on ground duties and was called up for a review in December, 1956.

He appeared again for an examination on the 13th. He was given the same drawing test of intelligence. This time, he was able to finish the test ahead of time and appeared to do the test in a confident manner. On scoring, it was found that this time his score was about the same as when he did it originally, in 1953. In terms of marks he jumped from 6 in July, 1956, to 15 in December, 1956, whereas his original score on entry in 1953 was 16. His E.E.G. report on 23rd November, 1956 was:—

"The dominant activity in the occipital region is an alpha rhythm of 9-10 cycles per second. It is bilaterally symmetrical, spreads forward equally and responds to eye opening and eye closing. The overbreathing response is unstable and an occasional delta

activity of 2 to 3 cycles per second appears in both temporo-parietal areas. Traces of theta activity are also found in the same areas.

Comparison with the previous E.E.G. record, the sharp waves and spikes seen in the previous record taken are not found and the beta activity reported at that time is also not seen now. Similarly the slower activity in the delta and the theta range is comparatively less prominent."

This shows that he made an adequate recovery from the functional point of view. Generally, the E.E.G. dysrhythmia outlasts the symptoms which can explain the occasional delta activity.

Summary

A pilot who sustained a closed head injury in March, 1956 was found to be clinically symptom free in July 1956. However, a drawing test of intelligence revealed a poor performance in that test alone, whereas in the verbal test of intelligence his performance remained unchanged. His E.E.G. taken at that time showed abnormal activities primarily over the right temporo-parietal area. In December, 1956, after a period of five months, the patient showed functional recovery in that he did the drawing test of intelligence as well as his original record and his E.E.G. also confirmed this. This drawing test of intelligence involves primarily spatial judgment and manipulation and manifestly the functional factor impaired was one of visual spatial judgment and manipulation. This faculty is generally described as visual psychic function and the area of the brain controlling this faculty is said to be just anterior to the occipital pole extending on to the parietal and temporal lobes. Thus with the aid of a paper and pencil test it was possible to localise an area of damage to this particular part of the brain. How far this faculty is important in flying, particularly high speed flying, is still a problem to be confirmed by further research. Further modifications of this test may be useful in the selection of high speed fliers.

Acknowledgements

The tests used were constructed at the Psychological Research Wing, Defence Science Organisation, Ministry of Defence and are used as ordinary tests of intelligence. It was with the kind permission of Dr. Sohan Lal that they were utilised for clinical purposes. My thanks are also due to Mr. Deshmukh, who actually administered the tests and made the relevant observations.