SPEECH PERSEVERATION AND ASTASIA-ABASIA FOLLOWING CARBON MONOXIDE INTOXICATION*

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THE following case is presented because of its apparent rarity, and also because of the light which it may throw upon some psychological aspects of basal ganglion function. A strikingly similar case has been recorded by Wolff¹ under the title of 'A Case of Astasia-Abasia and Speech Perseveration Following Carbon Monoxide Poisoning.' Oppenheim² refers to the occurrence of astasia-abasia as a manifestation of carbon monoxide intoxication. The possible significance of this case with respect to basal ganglion function is, however, our main concern in this report.

CASE HISTORY †

J.W. is a white Jewish male, 46 years of age, who attempted suicide by inhaling the exhaust from his automobile on June 18, 1935. After a four weeks' stay in a general hospital he was admitted to the Worcester State Hospital. It was reported from the general hospital that he had been in coma for 72 hours after admission, and that his neurological and mental condition had remained unchanged from that time until the day of his transfer. During this time he was said to have been 'confused and demented.'

Family History.—The patient's father died at 74, the cause of death being unknown. His mother deserted the family when the children were very young. Their upbringing was soon entrusted to a stepmother. The oldest brother, now 54 years of age, is said to have been mute since birth and is in an institution. A sister, age 52, was admitted to the Worcester State Hospital in 1929 for attempted suicide. She was considered to be suffering from manic-depressive psychosis, was depressed, and was discharged several months later, unimproved, to another institution.

Personal History.—The patient was born in New York; the details of his birth are unknown. At the age of nine he had to go to work as a peddler. He was discriminated against by his stepmother, who favoured her own children, and at the age of 17 he ran away from home to join the army. He married at 26. There have been seven children, ranging in age from eight to 19. He never had any serious illnesses. His wife has stated that he never liked to have his children near him, that he was very shy, and that he had few acquaintances and no friends. When at home he always stayed

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† The patient, while in the Worcester State Hospital, was under the care of Dr. Morris C. Beckwitt, to whom the writer is indebted for data in the history and for a report on many of the clinical manifestations.

by himself, spending his time reading newspapers and magazines. For the past 12 years he had been employed as a caretaker on a large estate at a moderate wage. Following two large wage cuts within the past year, and after his oldest son had lost his job, he is said to have become very depressed and even more seclusive than before. On June 18, 1935, he was found unconscious in his car. There was a rubber extension from the exhaust pipe into the car; the motor was running and the windows were shut. His condition at the general hospital has already been described.

Physical examination at the time of his admission to the Worcester State Hospital on July 18, 1935, revealed a well-built male with good muscular development. His complexion was ruddy. His pupils were equal, regular, and reacted swiftly to light and accommodation. The tongue protruded in the midline with a coarse tremor. There were no unusual findings in his chest and abdomen. He was unable to support his weight on his legs, which were somewhat weak. There was no impairment of strength in his upper extremities, on which he relied to support himself. When he placed his feet on the floor they underwent marked clonic contractions. There was a coarse rhythmic tremor of the hands. The triceps reflexes were diminished but all other deep reflexes were hyperactive. The abdominal reflexes were lively. No pathological reflexes were elicited. There was continual urinary incontinence. Blood counts and urinalyses were within normal limits. The blood Hinton test was negative.

Mental examination revealed the patient to be restless, somewhat excited, and apprehensive. He was confused and completely disoriented. There were profound memory disturbances. He seemed quite apathetic, was very distractible, and showed no insight. His speech was slurred, monotonous, and rapid. When asked questions he appeared to comprehend them, but his answers were merely repetitions of the last word or two of the question. For example, when asked, 'Why did you come here?' he kept repeating, 'Come here, come here, come here,' etc., until he was interrupted by the next question.

A few days later the nature of his speech responses was somewhat more complex in that they now were of the nature of answers. For example, when asked, 'Did you take gas?' he answered, 'I took gas, I took gas, I took gas,' etc. Question: 'What kind of gas?' Answer: 'Regular gas, regular gas, regular gas,' etc. Occasionally there were spontaneous utterances which consisted of various requests which he repeated over and over; for example, 'Give me milk, give me milk,' etc.; 'Come here, come here, come here,' etc. It was noted that the tremor of both hands disappeared when he was silent but became active whenever he spoke.

About a week later his mood became somewhat more cheerful and he frequently laughed in a rather silly fashion at some of the vulgar expressions of one of the disturbed patients in the ward. He sometimes repeated these words over and over. When silent his face appeared almost mask-like. He made frequent attempts to leave the bed and appeared anxious when he was restrained. His attempts to get out of bed, however, were numerous and when successful he fell to the floor in a heap. On one occasion at about this time he said that he was 14 years old and that his oldest son was 19 years old. When asked how this was possible he answered, 'I guess it's a mistake, I guess it's a mistake,' etc., for two minutes; his attention was then apparently distracted by some exclamation of another patient, and he said, 'Did you hear that, doc? Did you hear that, doc?' etc. He repeated the digits 4-6-9-2 correctly, but when asked to repeat 2-9-6-3-4, for example, his response was 2-9-5-3-3-3-3-3- etc. He was able to read a simple paragraph (the Cowboy Story in Cheney's *Outline*), but mispronounced many words and left out many short words. When asked what the story was about, he answered over and over, 'It's about a cowboy, it's about a cowboy,' etc. He was asked, 'Can't you stop repeating?' and he answered, 'Yes, I can stop repeating; yes, I can stop repeating,' etc., for almost three minutes. His writing at first was merely a series of irregular lines, but later was of

the same nature as his repetitive speech (see figs. 1 and 2). No tremor was noticeable while he was holding the pen. At no time was any evidence of hallucinations or delusions elicited.

During the first month of hospitalization there was a rather gradual diminution

HANDWRITING SPECIMENS

1. Write your address.

2. Write the letters of the alphabet.

14 Stomach
14 Stomach Pul.
14 Stomach Pul.
Wm. W. Wm.
14 Stomach Pul.
14 Stomach Pul.
14 Stomach Pul.
Wm. W. Wm.
14 Stomach Pul.
14 Stomach Pul.
Wm. W. Wm.
Wm. W. Wm.
age 42 old

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z

FIG. 1.

FIG. 2.

in the frequency with which the patient manifested speech perseveration. When it occurred it was usually of the nature of complete sentences rather than of single words. Sometimes he said the same thing over and over with somewhat different words, but the same idea was obviously repeated. By the end of two months the tremor had disappeared. The speech perseveration occurred only occasionally, as

after a long conversation or when the patient was fatigued or excited. On these occasions the tremor of his hands also recurred.

The use of the legs returned gradually and by the end of September, 1935, he was able to walk and run the length of the ward. He was extremely underactive and usually had to be escorted to meals and to the bathroom. Urinary incontinence sometimes occurred. His stance was generally one of flexion of the head on the trunk, the trunk on the pelvis, the arms at the elbow. It was noticed that he walked and ran on his toes, with his body leaning forward, and that his steps were short and rapid (propulsion gait). After a short demonstration of walking and running he appeared to have difficulty in keeping from falling. He would thrash his arms about and lean against a nearby wall or bed. When not within reach of some such support, he would fall to the floor, his knees slowly folding under him—so slowly in fact, that it was always possible for him to break his fall by catching himself on his hands.* At this time neurological examination revealed ironed-out facies, bilateral ankle clonus, and exaggeration of all deep reflexes. There was no muscular weakness or spasticity and no disturbance of deep or superficial sensibility. He still showed disorientation and profound memory impairment.

About four weeks later he left the hospital without permission. He was found a few hours later two miles away, having covered the distance on foot. Shortly after this incident he was discharged to his home. There was no change in his general physical condition; neurological examination was the same as at the preceding examination. He was disoriented and had marked memory disturbance. His speech was unusual only with respect to the occasional repetition of sentences and ideas when he became excited or fatigued.

DISCUSSION

In this case, as in many others reported in the literature, the psychiatric picture is probably complicated by factors other than those referable merely to carbon monoxide intoxication. In Wolff's case, for example, alcoholism, manic-depressive psychosis, and arteriosclerotic changes were pointed out as of possible significance. In our patient there is a family history of manic-depressive psychosis and congenital mutism. Furthermore, it is possible that the present picture is coloured, perhaps conditioned—at least to a certain extent—by the depression which preceded the exposure to carbon monoxide and which may still be present. In addition to these factors, one must also bear in mind the patient's previous personality 'make-up.' From available information it seems likely that he has been an impulsively weak, affectively poor, passive autistic, perhaps schizoid psychopath. What the significance of such complex psychopathic manifestations may be in a total picture in which intoxication is apparently in the foreground is difficult to evaluate; that they play some rôle is, however, more than likely.

There appears to be undoubted evidence of damage to the basal ganglia, particularly to the corpus striatum, as witnessed by the neurological signs of mask-like facies, general flexor stance, tremor (which has since disappeared),

* It may be of significance that, when the patient was asked why he fell, he once answered, 'I guess because I'm looking for sympathy.' Such 'insight' is probably more apparent than real since he may merely have been expressing comments which other patients had freely offered to him on his gait disturbance.

general poverty of movement, and also, probably, the propulsion gait. Cerebral damage is also to be inferred on the basis of the attentional defects, associative and memory disturbances, and dementia. The Parkinsonian picture may include manifestations which are contributed by a depressed stupor; at no time since coming out of coma, however, has the patient's mood been one of depression. Rather it has been one of apprehensiveness, apathy, or empty cheerfulness. There is no retardation, nor has it ever been observed; commands are executed in a rapid, though clumsy, manner. Because of the neurological signs which point to these regions of the brain, it seems permissible to regard the specific psychiatric disorders which interest us in terms of disturbed cerebral and, especially, basal ganglion function.

The features which we wish to emphasize in this case are the speech perseveration and the astasia-abasia. The rarity of occurrence of these symptoms in carbon monoxide poisoning has already been referred to. Merzbach,³ on the basis of an extensive review of the literature and 24 personal cases, has ascribed pathological repetitive speech to the caudate nucleus of the basal ganglia, particularly the anterior portion. We feel justified in relating the speech perseveration to the corpus striatum because of its intimate clinical association with the tremor; the tremor was most pronounced when the speech perseveration for single units was most conspicuous; later in the clinical course they improved together; under excitement and fatigue both became more pronounced; and although the tremor disappeared before the cessation of speech perseveration, both returned on those occasions when excitement or fatigue supervened. One cannot, however, say that the speech perseveration is of the same nature as the tremor, indicating with such a statement that the mere repetition of words is nothing more than repetitive laryngeal movements similar to the manual movements of the tremor. Speech is obviously more complex than so simple a formulation can account for. Furthermore, the fact that writing disturbances were similar to those of speech takes the repetitive phenomena out of the realm of simple muscular (laryngeal) repetitive activity.

It is interesting, from a psychological point of view, that the recovery of speech was of the order of a progressive grouping of increasingly complex units. At first the patient repeated continually merely the last word of the examiner's question (repetitive echolalia); then he began to *answer* repetitively with only one or two words; as time went on, phrases of greater and greater length were spoken in a repetitive manner. His answers have always been relevant. At the present time (four months after the onset), repeated single words occasionally crop up in a sentence. Altogether, the general course of speech recovery may be said to have been in the direction of an increasing grouping of words, from single words to complete sentences. Whether or not the first transition, from repetitive echolalia to repetitive single words as answers, may also be considered of the same order of 'graded' psychological function as the later increasingly complex word-grouping, is a

matter of speculation. One may also speculate upon the significance of the more complex configuration of the speech and writing expressions in terms of an increased capacity to group ideas as due to or in spite of the automatization of motor activity which has characterized the patient's clinical course.

The astasia-abasia, as another unusual feature of the clinical picture, must be regarded as a hysterical inclusion within the picture of organic brain damage (cf. Oppenheim). The patient's gait was propulsive in character; it seems uncertain whether it also is a hysterical manifestation. The hysterogenic nature of the astasia-abasia is indicated by the fact that in falling the patient always lowered himself carefully to the floor, that he seemed to utilize the fall for the sake of receiving sympathy, especially in the presence of an audience, and that on one occasion he walked for two miles with no difficulty. Wolff ascribed the astasia-abasia of his patient to the basal ganglia, indicating thereby the possibility of localization of hysterical manifestations in this region of the brain. We are not ready, on the basis of the clinical findings in our patient, to be in complete accord with this concept because of the complicating features, such as personality psychopathy, depression, and probable organic cerebral changes, in addition to the basal ganglion picture. On the other hand, the association of the astasia-abasia with the speech perseveration may argue for a common localization of these neuropsychiatric signs. The rôle of the corpus striatum, indeed, seems to us most significant in this connexion. Although it is granted that this region of the brain does not act independently of others, it seems plausible to ascribe the phenomena under consideration, at least in part, to its dysfunction.

Let us return to an analysis of the speech perseveration in our patient. There seems to be revealed that the repetition of digits, words, phrases, and sentences, perhaps of ideas also, may be quite independent of mere 'automatization.' Rather it may be due to a state of generally increased suggestibility. An action, a word, a group of words, an idea, may serve as strong suggestion to a repetition of that action, word, group of words, idea, for a more or less indefinite period. The tremor, by virtue of its intimate association with the speech perseveration, may also fall within this category of explanation, but we hesitate to speculate upon this beyond mere mention. The astasia-abasia, as a manifestation of hysterical psychopathy, can readily be accounted for on the basis of increased suggestibility. In the light of this general factor (hypersuggestibility) it seems possible to explain the origin of the speech perseveration and the astasia-abasia. These clinical manifestations, on the basis of such an explanation, become more than mere reactions of the nature of released primitive movements due to corpus striatum damage, but rather become understandable as expressions of a personality under certain changed physiological conditions. One may be permitted the generalization that suggestibility and its deviations in a plus or minus direction may be intimately associated with basal ganglion function. Such an observation is borne out not only in our case but also in that large group of postencephalitic

pictures in which changes of suggestibility are a prominent feature, particularly with respect to anancastic ideas and actions. The catatonic syndrome may also be referred to in this connexion. It is not to be inferred from these statements that we consider suggestibility to be localized in the basal ganglia. Rather we hypothesize that by virtue of the specific diminution or outfall of certain basal ganglion functions, due to organic damage, there is brought about a lowered threshold ('increased suggestibility') for the repetition of activities initiated from higher centres (the cerebrum). This hypothesis may also be stated in terms of disturbance of inhibition of corticofugal impulses by basal ganglion outfall. Our patient's diminished critical capacity, referable perhaps to cerebral changes, may also contribute to his hypersuggestibility.

We would like to suggest that the consideration of the neuropsychiatric significance of these manifestations in terms of changed suggestibility might also be applied to other clinical disorders in which basal ganglion dysfunction plays a prominent rôle. In any event, it appears to us that the speech perseveration and the astasia-abasia in this patient's clinical picture are most readily understandable by means of this formulation.

SUMMARY

A case history is presented of a patient in whom speech perseveration and astasia-abasia became manifest subsequent to carbon monoxide intoxication. Only one similar case (Wolff) has been reported previously in which both these signs occurred, and there is only one other brief mention (Oppenheim) of the occurrence of astasia-abasia following such intoxication. These clinical manifestations are ascribed to basal ganglion dysfunction. The hypothesis is formulated that, under such physiological conditions, there may occur changes of suggestibility by virtue of which this unusual picture may be described and explained.

REFERENCES

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