

PSYCHOSES ASSOCIATED WITH VASCULAR DISEASE

GUY H. WILLIAMS, Jr., M.D.

Department of Neuropsychiatry

Theoretically, senility and arteriosclerotic brain disease are distinguishable, but in practice such a differentiation often becomes difficult.

In reviewing the early literature on mental symptoms of the aged, one discovers that much has been written concerning senile psychoses, but material on the psychoses of arteriosclerosis is scant.

The arteriosclerotic brain and the senile brain each have distinct pathologic patterns. Disease of the blood vessels is not constant in the aged and in itself cannot be considered the sole basis for the pathologic findings of senility.

In general, arteriosclerotic brain disease occurs in people over 50 years of age. The fact that there is a familial variation of this disorder has been well established. Certain factors such as worry, alcoholism, extreme mental exertion, and diet are considered to be contributory. The condition of the "arterial tree" is often an excellent index of one's age, and the adage that "a man is as old as his arteries" holds much truth.

Cobb classifies the pathologic changes of cerebral arteriosclerosis as follows:¹

1. Large vessel sclerosis. This type involves primarily the arteries of the base of the brain as well as the larger vessels of the cerebrum, cerebellum, brain stem, and choroid plexus. The process is rare in the vessels of the cortex, and from the histologic standpoint resembles arteriosclerosis as seen throughout the entire vascular system.

2. Arteriolar sclerosis. Arteriolar sclerosis is characterized by a hyaline degeneration of the intima in the arterioles and capillaries. It is a diffuse hyperplastic process involving primarily the vessels that supply the cerebral cortex and nuclei. In advanced cases degeneration is also seen in the media and adventitia. This type is commonly associated with hypertension.

3. Capillary fibrosis. Capillary fibrosis is most frequently seen in presenile dementia and Alzheimer's disease. In this type of pathologic change, thickening of the adventitia of the capillaries is observed. Cobb states that this process may be the result of arteriosclerosis rather than part of the arteriosclerosis itself.

4. Endarteritis. Endarteritis resembles the changes seen in syphilis and is rarely encountered in arteriosclerosis.

5. Vessel calcification. Calcification of cerebral vessels occurs in late stages following fatty degeneration of the intima.

Subsequent remarks regarding cerebral arteriosclerosis shall be confined to the clinical pictures observed in two types of vessel involvement, namely, the disorders of essential hypertension or arteriolarsclerosis and those encountered in simple arteriosclerosis or large vessel sclerosis.

The patient afflicted with arteriolarsclerosis may be relatively young, that is, in the third to fifth decades of life. The clinical picture is usually characterized by excessive and persistent elevation of both the systolic and diastolic blood pressure, moderate reduction of renal function, impairment of the heart from hypertensive disease and varying degrees of petechial hemorrhage, softening and scarring of the brain.

There has been much controversy as to whether disease of the blood vessels causes hypertension or whether the reverse be true. Regardless of cause and effect, it appears rather certain that emotional strain may predispose to or cause disease of the blood vessels. The relationship was well illustrated by Kasanin in a paper entitled *Early Psychic Invalidism*² in which he described mental involvement in young people who were subjected to the rigors of the world war and Russian revolution. These individuals presented clinical and pathologic evidence of cerebral arteriosclerosis.

The pathology of arteriolarsclerosis of the central nervous system may readily simulate the condition found in the kidney of essential hypertension, characterized by petechial hemorrhages, loss of cells, and resultant fibrosis. Because of multiple petechial hemorrhages having been present in the brain, the amount of resultant scarring may be pronounced. This scarring gives rise to extensive loss of cortical cells and defects in the white matter.

Mental symptoms of essential hypertension are extremely variable, depending upon the degree of involvement. Headache, vertigo, head noises, tension, and anxiety are common. Irritability, outbursts of impulsive behavior, and emotional instability characterized by unprovoked laughing or crying are frequently observed. Intelligence may be unimpaired in the early stages. Fluctuations of the above symptoms are noted from time to time even though the basic disease continues to progress.

Providing death does not intervene, the mental changes tend to become chronic. In addition to the above findings, impairment of memory becomes evident, the power of concentration is lessened, endurance and

initiative are diminished. The prognosis in this condition is uniformly poor, and the process may run a course of a few months or years. On rare occasions such individuals develop delirium, manifest amentia, and actually may be reduced to a vegetative level.

The treatment of this mental illness is quite limited and, unfortunately, is not too successful. As soon as the condition is suspected the patient and relatives should be advised as to the general hygienic measures indicated, warned regarding the patient's participation in undue physical and mental exertion, and his avoidance of emotional strain or tension. In the earlier phases treatment may be carried on in the home, but as the disease progresses and the mental status becomes uncertain, hospitalization in a sanitarium or mental hospital is advisable.

All measures to reduce blood pressure should be employed, and, unless the condition has progressed too far, sympathectomy should be given serious consideration. It is possible that reduction of the blood pressure may retard or completely arrest the arteriolar involvement of the brain.

A note of caution about the use of certain medical words and conversation before a patient might not be amiss. This applies particularly in discussion of arteriosclerosis and hypertension, for the anxiety of the hypertensive or arteriosclerotic patient has often been increased by injudicious use of these terms. The average person is sufficiently well versed in medical terminology to be aware of the fact that these two terms have an ominous connotation. Instead, why not use the phrase, "arterial changes of aging", or in the case of the hypertensive say, "I am satisfied with the test", or "the blood pressure is satisfactory". These phrases have been suggested by Thewlis in his recent book, *The Care of the Aged*.³ He states, "There is no type of patient in whom exaggerated fears are more evident than in hypertensive victims, and one should not add insult to injury by a careless selection of words. These patients weigh every word the physician utters. Therefore, the wise physician weighs his words at every turn, and never deviates from his formula."

Cerebral arteriosclerosis of the simple or large vessel type occurs for the most part in people over 50 years of age, and some investigators consider it to be a normal physiologic process in persons over that age.

"Wartman found that 90% of men, and 85% of women past sixty, had marked cerebral arteriosclerosis; all others had some pathologic condition of the brain at the time of death, yet they did not present marked symptoms."¹

Disorders of personality arising on the basis of arteriosclerotic brain disease accounted for approximately one-third of the organic reaction types in Billings' series of cases.⁴ The onset of mental symptoms in this

type of sclerotic vessel change may be gradual or may follow an apoplectic seizure of minor or major severity. The degree and extent of vessel involvement governs to a large measure the mental symptoms and neurologic picture encountered. In the less complicated cases, headache, dizziness, insomnia, and minor personality changes may be present. Mental depression and paranoid trends often present themselves as added features. Persons having mild to severe vessel involvement demonstrate defects of memory of recent events, and the amnesia often increases to include remote happenings. Occasionally confabulation is resorted to in filling memory gaps. Emotional instability giving rise to pathologic laughing or crying is not uncommon. Defects in judgment, impairment of mental concentration, and easy mental fatigue are common. As a general rule, until more advanced stages are reached the basic personality is not markedly altered. However, as the disease progresses the once amiable person may become irritable and manifest impulsive behavior. He may further reveal indifference in his personal appearance, whereas previously he had always been fastidious as to dress and cleanliness. The more advanced cases demonstrate defective judgment which often leads to abnormal behavior, and sexual misdemeanors of assault on minors occasionally occurs.

As stated previously, headache and dizziness are probably the earliest physical symptoms. Tinnitus or head noises are frequently bothersome and, incidentally, present an enigma from the therapeutic viewpoint. Attacks of vertigo and fainting can be explained by a vascular disturbance of the vestibular mechanism.

Physical signs vary considerably, depending on the degree of vessel involvement and the presence or absence of apoplectic attacks. It is possible for the uncomplicated cases to demonstrate unsteady gait, dysarthria, tremor of the hands, and less frequently tremor of the head. The pupils are small and sluggish in about 25 per cent of the cases. Sclerosis of the vessels of the optic fundi may or may not be apparent. As a general rule, sclerosis of the retinal vessels serves as a fair index of the condition of the cerebral arteries. The systemic blood vessels need not necessarily show sclerotic changes.

Those affected with cerebral arteriosclerosis are subject to convulsive disorders and apoplectiform attacks. Convulsions may be the most prominent feature of the disease. When such a symptom heralds disability, extreme care must be given to exclude other possible sources of convulsions, for example syphilis, brain tumor, cerebral atrophy, trauma, and alcoholism. Those persons having vascular accidents, whether they be the result of hemorrhage, thrombosis, or angiospasm, present a variety of symptoms and signs. Hemiplegia, hemiparesis,

apraxias, and aphasias are not uncommon, while muscular rigidity and contracture may be seen in advanced cases.

The majority of neurologic disturbances in arteriosclerotic persons result from thromboses with subsequent softening of brain tissue rather than from hemorrhage. Mild degrees of thrombosis or angiospasm probably account for the transitory neurophysiologic disturbances. Cerebrospinal fluid analysis may show a slight increase in the protein and cellular contents.

Here, as well as in the arteriolarsclerotic involvement of cerebral vessels, the clinical course is one of gradual deterioration and, broadly speaking, the prognosis is uniformly poor. Complicating renal or cardiac disease as well as intercurrent infections may shorten the course or cause death at any time.

Until the etiology of arteriosclerosis is more clearly understood, prophylaxis is limited to improving the mental and physical health of the patient in general. The treatment of cerebral arteriosclerosis holds no great promise to the one so afflicted. Improvement of the general physical and mental health and avoidance of physical exertion and emotional strain are of prime importance. Hobbies, occupational therapy, and mild exercise such as walking can be used to advantage.

Dietary regulation is essential. Should the patient have an exaggerated appetite, the food intake must be limited, particularly if there are complications such as cardiac or renal disease and hypertension. On the other hand, if the nutritional status is deficient, appropriate corrective steps should be taken. Supplementary vitamins in adequate amounts can be employed to good advantage in practically all cases.

Supervision even in the mild disorders of cerebral arteriosclerosis is wise and absolutely essential in those having moderate to pronounced mental and physical signs and symptoms. Careful consideration should be given to the selection of nurses and attendants who are to care for these patients. These assistants should have the attributes of understanding, a kind and cheerful manner, tolerance, willingness to accept some abuse with grace, and an immeasurable amount of patience and tact. The services of a nurse or attendant not only fulfill the requirements of supervision but also afford the patient a companion. This is extremely valuable in allaying fears and anxiety that may arise if the patient is left alone.

If the home facilities are suitable and adequate assistance is available, many of the psychoses and neurologic disorders of cerebral arteriosclerosis can be treated in the home. However, when the mental reactions and physical status reach the stage where it is difficult to manage the patient at home, hospital care should be recommended. Too much

emphasis cannot be placed on constant supervision of the patient with mental "disorganization" due to arteriosclerosis. Frequently he is destructive and in unguarded moments may wander away from home and commit acts that are dangerous to the general public or cause embarrassment for the relatives. Complications such as depression or severe paranoid trends most often necessitate hospital care. When the physical condition is not too poor, electroshock therapy may be successfully employed in combating depression.

The appointment of a legal guardian obviates many difficulties that arise in the handling of the patient's financial and business affairs. A guardian, if acceptable to the patient, also relieves him of worry and anxiety regarding business matters.

The physician must also bear in mind that he, too, must be patient and understanding. A few words of cheer, encouraging remarks, and a little time spent in talking to the patient accomplish much in easing the burden on the individual or his family. The physician's responsibility also entails an explanation of the cerebral arteriosclerotic process to the members of the family. By so doing, the burdens and verbal abuses that are often brought down on the patient when he does not do the proper thing may be avoided. The family should be made to understand that father or grandfather is not stubborn when he refuses to comply with requests made of him, nor is he deliberately being mean and nasty when he manifests irritability. They must realize that his foreign actions and behavior are a product of the illness and that kindness and patience on their part will accomplish far more than verbal abuse and threats.

Judicious use of certain pharmacologic preparations is often a valuable adjunct in the treatment of this condition. Barbiturates may be employed as sedatives and hypnotics. However, if these preparations are selected for use, it is inadvisable to administer them for more than several days at any one time. Continued use of barbiturates may lead to the development of toxic reactions, since the rate of excretion is low and the effect cumulative. Even though the taste be objectionable and the odor offensive, paraldehyde is probably the safest and most satisfactory hypnotic. Its acute toxicity is low, and since it is rapidly excreted the cumulative dangers are reduced to a minimum. If paraldehyde is given orally it is less objectionable when mixed with chipped ice in small amounts of milk or tea. It can also be given by rectum if mixed with a small amount of mineral oil. Intramuscular and even intravenous administration is possible when smaller doses are prescribed.

Although the presence of cardiac toxicity is debatable, it is the general belief that use of chloral for arteriosclerotic subjects is unwise. Small amounts of bromides may prove beneficial as sedatives in this

condition, but here again continued use is contraindicated, due to the cumulative effect.

Convulsive disorders associated with cerebral arteriosclerosis can in most instances be adequately controlled with dilantin or a combination of dilantin and phenobarbital.

The therapeutic value of the long-employed iodides is certainly questionable. Actually there is little evidence to support the theory that iodides cause absorption of inflammatory tissue.

Due to the cerebral vessel changes, namely the presence of sclerotic patches and loss of elasticity of the vessel wall, the blood flow to the brain is decreased. Compensation for this is often provided by increased blood pressure. Consequently, unless distressing symptoms appear it is unwise to attempt to reduce the blood pressure. In cases where the pressure is low the number of cerebral insults may be increased.

Normal physiology of circulation entails a drop of blood pressure while the subject is resting or sleeping. Consequently, more vascular accidents occur at this time, possibly as the result of reduced cerebral flow. This accounts also for episodes of nocturnal confusion demonstrated by many arteriosclerotic patients. The confusion may well be due to cerebral anoxia.

Caffeine, and particularly nicotinic acid, are capable of aiding in the production of increased blood flow. While the results with these preparations are not startling, a number of patients have been aided by their use. Caffeine can be easily supplied by giving the patient a cup of strong coffee. Investigation has shown that nicotinic acid is probably more effective than caffeine as a vasodilator. Paresthesias and blushing of the skin caused by nicotinic acid are at times sufficiently troublesome to the patient to prevent the use of this preparation. Hour-of-sleep doses of caffeine or niacin may be combined with a hypnotic, the latter being given to counteract the stimulant effects of these substances.

The introduction of the sulfonamides and penicillin as well as other advances in medical and surgical treatment have definitely increased life expectancy.

Within the past few years welfare authorities have been faced with a problem of steadily increasing importance, the care of psychotic old people. Statistical surveys have shown that the increase in hospital admissions of patients 65 years of age or older has exceeded the increase in all other types of admissions. Johnson⁵ predicted that within less than a decade senile psychoses and psychoses with cerebral arteriosclerosis will relegate schizophrenia to second place in the number of new admissions to mental hospitals. In fact, he considers it likely that this problem will

place a greater burden on public mental hospitals than will returned veterans or any other single factor.

The establishment of geriatric units in all mental hospitals has been advocated by Johnson and others.⁵ It is hoped that such innovations will produce new methods of treatment as well as lend more dignity and respect to the task of treating the senile. We, as practicing physicians, must of necessity adequately prepare ourselves to render satisfactory service in caring for the aged.

References

1. Cobb, Stanley: Foundations of Neuropsychiatry. Second revised and enlarged edition of the work formerly known as A Preface to Nervous Disease (Baltimore: William Wood & Co., 1941) p. 179.
2. Kasanin, J. S.: Early Psychic Invalidism, cited by Cobb, Stanley¹. p. 179.
3. Thewlis, M. W.: The Care of the Aged (Geriatrics). ed. 5 (St. Louis: C. V. Mosby Co. 1946).
4. Billings, E. G.: A Handbook of Elementary Psychobiology and Psychiatry (New York: Macmillan, 1939).
5. Johnson, H. A.: Growing problem of old-age psychoses; analysis of trend in one state hospital from 1910 to 1944. *Ment. Hyg.* **30**:431-450 (July) 1946.