A CLINICAL-ANATOMICAL CLASSIFICATION OF THE SENILE AND ARTERIOSCLEROTIC DISORDERS.*

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SENILE DISORDERS.

- I. SENESENCE.
- II. SENILE DEMENTIA.
  - i *Diffuse atrophy.*
  - ii *Focal atrophy.*
    - (a) Hemisphere.
    - (b) Lobe.
    - (c) System.
- III. SENILE DEMENTIA AND ARTERIOSCLEROSIS.

ARTERIOSCLEROTIC DISORDERS.

- IV. ARTERIOSCLEROTIC DISORDERS.
  - i *Incipient type.*
  - ii *Focal types.*
    - (a) Trunk disorders.
      - 1. Basilar-carotids.
    - (b) Branch disorders.
      - 1. Inferior cerebellar.
      - 2. Superior cerebellar.
      - 3. Posterior cerebral.
      - 4. Middle cerebral.
      - 5. Anterior cerebral.
    - (c) Twig disorders.
      - 1. Medullary.
      - 2. Cortical.

V. CONCLUSION.

SENESENCE.

The completion of normal growth is usually attained in the fourth decade of life and is followed almost immediately by the first signs of regression. These signs are likely to appear earlier in the parenchyma of an organ than in its mesoblastic components,

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the nobler elements being the more vulnerable. The central nervous system, like any other organ, has its distinct biotrophy or vital elasticity characteristic of the individual, and often of groups of related individuals. It may, therefore, age more or less independently, in some individuals earlier, in others later, in all inevitably.

When physiological involution anticipates in time or exceeds in direction, extent and severity normal senescence, the various *senile* and *arteriosclerotic* disorders are the result. The former is essentially an atrophic parenchymatous process, the latter largely a mesoblastic vascular disorder; between the two are intergrading conditions and combination forms. A critical analysis, however, makes it possible to identify the individual organic mechanisms at work, estimate the preponderant elements present and make certain clinico-anatomical groupings with considerable precision.

SENILE DEMENTIA.

Simple Senile Dementia.—Senile dementia shows itself particularly in a progressive narrowing of interests and impairment of retention with their consequent disorders in orientation, elaboration and train of thought; it is usually independent of simple arteriosclerosis and vascular lesions. Any further psychotic features present are comparable with similar conditions occurring in earlier life, except as they may be modified by the senile changes which form the setting and background of the psychotic picture.

The brain shows a general atrophy, narrowing of the convolutions, widening of the sulci, dilatation of the ventricles and reduction in gross weight. Nerve fibre loss is marked especially in the first, second and third layers of the cortex. The nerve cell count is diminished often to an extreme degree; many cells show acute or chronic alterations; both the large and small cells contain much pigment; in the superficial layers more especially microscopic focal necrosis is generally present and seems to bear a direct relationship to nerve cell loss. The neuroglia contains more or less pigment; hyperplasia and hypertrophy of the neuroglia varies in proportion to the rate and degree of parenchymatous degeneration and terminal toxic states. The pia and blood-vessels show essentially regressive alterations.

Senile Dementia with Focal Atrophies.—While simple senile dementia is usually a diffuse non-systemic disorder involving cortex and marrow, brain and cord, atrophy may reach a higher grade in certain fields, justifying the belief that an elective atrophy, conditioned perhaps by a different life capacity or greater vulnerability of certain regions of the brain, may involve an individual hemisphere, lobe or functional system. It is rather striking that the left hemisphere, the left temporal and occipital lobes, are more likely to be thus involved. In these localities, aside from the gross evidence of atrophy, numerous microscopic necrotic foci are seen, associated with which are various degrees of nerve-cell loss. In consequence, focal symptoms more or less definite, may arise, corresponding to the special field involved and the degree of injury sustained. It seems very probable (Pick) that certain word amnesias and paraphasic disorders may on this basis indicate a waning excitability of the auditory-sensory field, prodromata, perhaps, of approaching senile alterations. Certain transcortical disorders may have a similar basis. Likewise certain hemianopic affections, evidences of mind-blindness and asymbolic disorders are to be correlated with the occipital lobe atrophies. Careful casuistic studies are here needed. It is not impossible that a methodical analysis of certain of the senile confusions might reveal interesting data along these lines. It is a significant fact, that function is more subtle than structure, that physiological disturbances may precede demonstrable lesions. A study of the nerve-cell content and layering in these circumscribed atrophic fields is one of the present problems.

Senile Dementia and Arteriosclerosis.—Senile dementia has yet another aspect in that it may be compounded with arteriosclerosis. While senile vessel changes are not necessarily arteriosclerotic and arteriosclerosis may be present and bear no obvious relationship to the senile atrophy, being merely a concomitant process, sometimes a definite relationship exists. The most evident form which arteriosclerosis takes involves the terminal and short cortical vessels and small wedge-shaped foci of essentially cortical softening may be the result. These foci may be found in limited fields of the cortex and if multiple and extensive may lead to cortical irritative or focal defect symptoms in addition to the characteristic picture of senile dementia.

Briefly summarized: In the sixth, seventh and eighth decades of life, all transitions from the normal senium to a profound dementia may exist; the degree of dementia is roughly proportioned to the relative loss of brain weight and degree of parenchymatous degeneration present; the process is usually diffuse and non-systematized; sometimes a seeming elective atrophy is present, and occasionally arteriosclerosis is associated, involving particularly the finer cortical vessels.

THE ARTERIOSCLEROTIC DISORDERS.

The Arteriosclerotic Disorders.—The essentially arteriosclerotic disorders, on the other hand, develop clinically and usually reach their culmination in the fourth, fifth and sixth decades of life, in a period before senile changes normally become evident. In their incipency the arteriosclerotic disorders are little seen in the asylums, but retrospective evidence of the cardiac-vascular-nervous prodromata often appear in the anamnesis of those who later develop focal arteriosclerotic disorders.

The prodromes which arouse a justifiable suspicion of general, more particularly cerebral arteriosclerosis, may occur relatively early, usually in individuals of a pathological type, often with familial tendencies. They present a neurasthenic complex (Winscheid, Alzheimer, Binswanger); are uneven, abnormally irritable, restless, sleepless and suspicious, occasionally exhibiting paranoic trends; complain of head pressure or of sudden severe occipital headaches and positional attacks of vertigo and palpation of the heart; show mental fatigability and physical exhaustibility; display a capricious memory, especially for names and numbers and lapses in the train of thought; blood pressure of 150 mm. or more, increased tendon reflexes and muscular hypertonus are the rule. The operation of the mechanism underlying this cardiac-vascular-nervous syndrome is obscure; only in the sequelæ of changes and development of defect symptoms in the fifth and sixth decades, does the relationship come out more clearly.

There is a tendency for the arteriosclerotic disorder to involve certain vessels or systems of vessels. Thus the focal lesions may be *large* or *small*, *multiple* or *diffuse*, and may be referred to known vascular zones with considerable precision; hence the plan

of designating the disorders as those of the trunks, branches and twigs.

Basal Vessel Disorders.—The larger basal vessels, trunks, either by obliteration directly or by tortuosities or aneurysms pressing upon contiguous brain tissues, especially the cranial nerves, may give rise to various neurological symptoms.

Inferior and Superior Cerebellar Arteries.—Obliteration or occlusion of the inferior and superior cerebellar arteries may produce lesions with a definite neurological complex, but with little or no directly associated mental disturbances aside from the general arteriosclerotic syndrome.

Posterior, Middle and Anterior Cerebral Arteries.—Obliteration or occlusion of the larger primary cerebral arteries, posterior, middle and anterior, or their individual branches of distribution, give rise to the larger cerebral focal disorders, hemianopsia, aphasia, palsies, etc. Aside from the physical disorder resulting in such instances, the associated mental features are not only those of defect, *i. e.*, a deficiency in the psychic content, but are those also of a greater or less disassociation of the functional components still active: in the first place, because of the loss of so much psychic material, and secondly, the consequent interferences with the correlative and elaborative capacity of the cerebral mechanism, the clearer illustrations of which we see in the aphasic and hemianopic disorders, the vaguer in the general intellectual and affective disorders of the patient.

The Medullary and Cortical Vessel Disorders.—A series of cases have to do with the terminal vessels of distribution to the marrow and to the cortex. The medullary vessels penetrate the marrow from the pia, are fewer in number and anastomose less freely than the cortical vessels. The two systems are strangely enough, almost without exception, affected quite independently of each other and give rise to clinical complexes essentially different and fairly recognizable.

Medullary Vessel Disorders.—In the medullary vessel disorders the anatomical defects consist of small foci of softening, rarefactions and atrophies in the marrow, basal nuclei and brain stem. Depending upon the multiplicity and distribution of these foci, the clinical picture will vary. In addition to the usual subjective arteriosclerotic symptoms, the further development of the dis-

order is indicated by light or usually transitory apoplectiform attacks; with repetition, defect symptoms manifest themselves. The defects, and, therefore, the attacks, may be isolated and widely scattered and reveal themselves in any of the sensory or motor fields. Physical and mental enfeeblement may become extremely marked in the final stages of this disorder. Hemorrhage is most common in this class of cases.

Cortical Vessel Disorders.—The cortical vessel disorders affect the short cortical vessels. A single or several terminal arteriole systems may be involved or the process may be quite general. In the developmental stage the symptoms are usually irritative, twitchings, choreiform movements, light epileptiform or apoplectiform attacks may occur. With the disappearance of the nervous parenchyma and extension of the process, focal defect symptoms may develop; if the process becomes diffuse, widely scattered defect symptoms appear and a profound dementia develops.

This plan of study, although somewhat dogmatic, affords a plan for the orderly arrangement of facts. It has allowed us to make certain clinical-anatomical groups with considerable accuracy. Moreover, it gives us an analytical and synthetical survey of the senile and arteriosclerotic disorders, helps us to recognize the gaps in our knowledge, to understand the difficulties which arise and suggests to us the direction which research must pursue to fill them.