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IMPORTANCE OF ARTERIO-SCLEROSIS IN THE ETIOLOGY OF POSTERIOR SPINAL SCLEROSIS.

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IN studying the pathologic anatomy of posterior spinal sclerosis, one is struck by the fact that the lesion is practically confined to the dorsal and lumbar regions. In advanced cases the cervical cord is also involved, but this is probably in great part a secondary degenerative change. Cases of pure cervical tabes are certainly very rare, so rare indeed, as almost to put in doubt their existence as a part of tabes. So far as the histology of the spinal cord is concerned there is no reason why this should be so; the fiber-tracts increase rather than diminish from below upward, and *a priori* we would expect to find a larger area of sclerotic tissue in the cervical region than in the dorsal or lumbar.

In looking about for an explanation of this fact the first thing that strikes us is that the blood-supply of the three regions of the cord is derived from somewhat different sources. The cervical cord, the lower limit of which may be placed at the sixth cervical vertebra, is supplied with blood chiefly by means of the branches of the vertebral arteries. The vertebrals enter the spinal canal at the sixth cervical vertebra, and after giving off lateral spinal branches to the cord, send off two branches, which unite to form the anterior spinal artery, and two smaller posterior spinal branches. There are also a few small branches from the deep cervicals. These spinal arteries, viz., the anterior spinal and the two posterior spinals, run the whole length of the cord, forming a series of plexuses which supply both the cord and the vertebræ. The anterior spinal artery probably supplies the gray matter, while the posterior arteries, by means of the plexuses spoken of, are probably distributed to the white matter.

Below the level of the sixth cervical vertebra, or in the dorsal and lumbar portions of the cord, another very important set of vessels comes in, namely, the intercostal arteries. Each intercostal artery sends into the cord a spinal branch which enters more or less into the formation of the plexuses already spoken of. We have in the dorsal and lumbar regions of the cord a set of vessels not found in the cervical region. Moreover, these vessels are, probably, in the lower part of the cord, the most important source of the blood-supply, as the spinal arteries are, even at their origin small and tortuous, and in the lower regions of the cord very much reduced in size. The spinal branches of the intercostals probably enter the cord as peripheral branches supplying the fibers and not the gray matter.

The bearing of these anatomic facts upon the pathology of tabes becomes very apparent when we observe the character of the intercostal arteries. The intercostal artery is a small vessel coming off virtually at right angles to the great trunk of the aorta. Now, as Thoma, Welch, and others have shown, it is in this type of vessel that we find the beginning evidences of arterio-sclerosis. The mouths of these small vessels at length become surrounded with a mass of calcareous material and the lumen of the vessel more or less occluded. It is quite possible to have these small vessels involved before there is any general manifestation of arterial change. This is seen in the case of the renal artery, an artery of the same type, that is, coming off nearly at right angles to the large trunk.

After this condition of sclerosis, or, in a higher degree, atheroma, has involved the intercostal arteries, a diminished amount of blood would be sent to the spinal cord, and, as a result of this imperfect supply of nutriment, there occur atrophy and degeneration of the nerve elements. As a consequence of this degeneration of nerve-matter there starts, partly from the sheath of the nerve, partly from the bloodvessel, an outgrowth of connective tissue, which, in its turn, encroaches upon the softer, less resistant nervous matter, giving us the characteristic picture of sclerosis. It has been noticed that the vessels are very generally thickened in tabes, Gowers especially calling attention to this fact, but not enough stress has been laid upon the outgrowth of connective tissue from the sheaths of the nerve-fibers.

In considering the etiologic factors that by common consent are conceded to be the most important in the causation of tabes, we find the first place given to syphilis; next in importance, perhaps, is exposure to cold and wet, which in most instances means rheumatism; and third, but not as prominent as we would expect, is alcoholism. Now, these are exactly the conditions most favorable to the development of arterio-sclerosis. Syphilitic inflammation of the arteries differs in many particulars from the rheumatic and alcoholic forms, but, so far as the destructive process goes, is just as important. Experience has taught us that we can expect little more improvement in syphilitic arteritis than in arteritis from other causes. In a few cases, perhaps, treatment is effective, but only in a small percentage of cases.

The ultimate distribution of the various sets of vessels to the cord is still so imperfectly known that it is impossible to say how far we are warranted in applying this same idea to degenerative changes in the other fiber-tracts, or even in the cellular elements of the cord. Sclerosis of nerve-tissue is such a general process, such a common form of degeneration, that one cause is by no means sufficient to explain all cases. The idea suggested in this paper is meant to include the majority of cases. Undoubtedly, traumatism, peripheral disease, specific poisons, and the like, are accountable for many cases, and the connection between these causative influences and the disease in question is often very close.

With this idea of the pathology of posterior spinal sclerosis I have been treating three or four cases under my own observation, and a number of other cases under the care of my resident physician, with nitroglycerin. The principle upon which this plan of treatment rests is that thus the small branches of the spinal arteries are dilated, and a larger supply of blood thus afforded the cord. Of course this can, theoretically even, only be done to a comparatively slight extent. It is rather too soon yet to speak of results, but almost all of the patients thus treated have improved, some of them notably. The element of mental suggestion was carefully eliminated, or rather was guarded against, as the patients were not told that they were taking any special treatment, and the inquiries concerning improvement were not unnecessarily frequent. The most marked improvement was noticed in the relief of pain. Two patients reported that they had begun to notice great improvement in walking. The dose of the drug in most of the cases was one one-hundredth of a grain, in tablet form, three times daily. Occasionally it happens that a patient cannot comfortably take this dose, and I have had to reduce one-half, which seems almost infinitesimal, but in these susceptible persons one two-hundredths of a grain will flush the face. On the other hand, much larger doses may be given. One of my patients took for some time a fiftieth of a grain t. i. d. This patient, however, was not a tabetic.

It is probably premature to publish these notes, but I am anxious to see if this remedy proves as successful in other hands as it has in mine. Another point that I would like observed is the condition of the mouths of the intercostal arteries in cases of tabes. This is such a chronic disease that one has often to wait a very long time to collect enough autopsy reports to warrant the drawing of inferences.

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