

CHAPTER II.

THE INFLAMMATIONS OF THE SOFT SPINAL MENINGES.

LEPTOMENINGITIS SPINALIS.

THE soft membranes are rarely ever by themselves the seat of inflammation, whether of an acute or a chronic type. Such, however, may exceptionally occur as the result of traumatism, of overexertion, carrying heavy loads, or as a consequence of exposure to cold after sleeping on the damp ground in camping out, etc. (Braun, cf. lit.). But in the greater number of cases we have to do with the extension of an inflammatory process of an infectious nature, as in epidemic cerebro-spinal meningitis, or in tubercular meningitis, both diseases which affect the membranes of the brain as well as those of the spinal cord. That there are instances of meningitis secondary to other diseases, and under what circumstances they occur, we have already stated above. Here we only wish to draw attention to its connection with acute articular rheumatism, of which Krabbel (Inaugural Dissertation, Bonn, 1887) has reported an instance.

Pathological Anatomy.—Pathologically the acute spinal meningitis is divided into three stages. The first is characterized by a diffuse reddening and swelling of the meninges, more especially of the pia; the second by the appearance of a purulent or fibrino-purulent exudation upon this membrane. This may occur gradually, and may vary considerably in extent; it may be found over the whole length of the pia (always more on the posterior surface), or may be confined to circumscribed areas. In the third stage the pus becomes reabsorbed and thickening of the pia with the formation of adhesions between it and the dura takes place.

That the nerve roots also participate in the inflammation is evident from the hyperæmia of their blood-vessels, the infiltration of the interstitial connective tissue, and the eventual de-

generation of the medullated nerve fibres. If we remember the many processes by which the pia is united with the spinal cord itself, it is not surprising that the latter is implicated. On cross-section it looks in places injected, œdematous, and is seen to bulge; on the other hand, there are undoubtedly instances in which the cord does not take part in the inflammation.

The chronic form, which seems very rarely to occur primarily, and then only after the protracted abuse of alcohol, is usually preceded by the acute disease or is secondary to different spinal lesions or various affections of the vertebræ. The pathological changes occurring here can well be compared with those of the acute form. In this condition we find thickening and opacity of the tissue, masses of newly formed connective tissue, and adhesions to the dura. There is turbidity of the spinal fluid, which is abnormally increased, and sometimes abnormal formation of pigment. The brownish-red and black specks often seen are to be looked upon as the remains of previous hæmorrhages, in which the coloring matter of the blood has undergone changes (Eichhorst). In consequence of the extraordinary development of the processes of the pia, this membrane adheres very firmly to the cord, so that it can not be stripped off without loss of substance of the cord. Here, again, the nerve roots are implicated; as is evident from their changed appearance. They look flattened and atrophic.

Symptoms.—In the acute form pain undoubtedly plays the principal part. Even in the initial stage, which does not differ from that of other acute diseases in most of the symptoms (chill, general malaise, loss of appetite, disturbed sleep, elevation of temperature), the pain along the spinal column is very marked. The patients are constantly troubled with it in whatever position they may lie, although it is especially sharp on any attempt to move or to sit up in bed. At the same time they feel an unwonted stiffness in the muscles of the back, and have difficulty on motion. On careful examination of the back we find that, although the spinous processes of the vertebræ are tender on pressure, and by the slightest tap or by the touch of a hot sponge pain is evoked, this is in no way comparable to that felt by the patient without any extraneous interference. This persists obstinately, and usually in the further course of the disease may radiate into the arms and legs, owing, of course, to the implication of the nerve roots. The

same factor also accounts for the different hyperæsthesias of the skin, the girdle sensation, the muscular pains, etc. Rigidity of the neck is only observed if the process has attacked the cervical portion. If the spinal cord itself becomes implicated, spinal symptoms, bladder disturbances, increased reflexes, and extensive sensory disturbances make their appearance. All these symptoms may persist unchanged for weeks, the patient feeling very badly and complaining of constant violent pain. If the disease take a favorable turn the pains gradually abate and the patient gets relief; but, on the other hand, the symptoms of irritation may give place to those of paralysis, and as anatomical changes go on in the nerve roots (degeneration, atrophy), we have analgesias and anæsthesias, the muscles become more and more incapable of performing their functions; they undergo marked atrophy, and on electrical examination distinct reaction of degeneration is found. There is direct danger to life (1) if the process extends upward to the medulla oblongata; in that case death may occur in a few days; (2) if owing to an extensive myelitis, bed-sores develop which lead to the utter exhaustion of the patient. Recovery may be complete or incomplete; in the latter case pareses, paræsthesias, and bladder disturbances are left behind as the result of irreparable anatomical changes.

The symptoms of the chronic do not differ much from those of the acute form. The pains, however, are occasionally less pronounced. They vary with regard to their violence and seat; sometimes they are most marked high up between the shoulder blades, sometimes lower down in the back, so as to interfere more or less completely with stooping; not rarely they are found to radiate toward the front of the thorax, sometimes on one, sometimes on both sides. Even slighter degrees of pain are sufficient to seriously interfere with the occupation of the patient, especially, of course, if the arms or legs, or what is, however, rather rare, all four extremities are implicated. Sensory changes are found in both the acute and the chronic form; an implication of the cord itself leads to the same symptoms of irritation or paralysis which we have before mentioned. The disease may drag out its course through a number of years and still there may follow a relative recovery; complete recovery I have never seen.

Diagnosis.—To make a correct diagnosis of this disease much experience and carefulness is necessary. Acute spinal

meningitis may be mistaken for muscular rheumatism and lumbago, the chronic form for what was formerly called spinal irritation and cord diseases. A differentiation from the former may be facilitated by an examination of the spinous processes for tenderness on tapping or touching with a hot sponge. In simple muscular rheumatism the spinous processes are not sensitive, whereas the different muscles are found to be tender if pressed or kneaded. Lumbago pains are recognized by their greater severity, their frequent change in locality, and their lesser persistency. Spinal irritation should only be diagnosed in very anæmic hysterical individuals; and the further course and final outcome of the disease will guard us against the assumption of the existence of a cord disease, for, if this be present, the issue is always unfavorable.

Treatment.—With reference to treatment, little is to be added to what has been said on page 321. Here, too, local measures—counter-irritation, etc.—must first be tried, and in case they should be found of no avail, prolonged tepid baths (93° Fahr., for from half an hour to an hour and a half) should be substituted. Electricity should also be used in the form of the faradic brush applied over the painful muscles. Gentle massage, if practiced by a competent person, is strongly to be recommended, and ought to be continued for a long time. The administration of iodide of potassium, for which no indication whatever exists, is to be condemned.

CHAPTER III.

HÆMORRHAGE INTO THE SPINAL MEMBRANES—MENINGEAL APOPLEXY —PACHYMEINGITIS INTERNA HÆMORRHAGICA.

THE vessels nourishing the spinal meninges are the anterior and posterior spinal arteries, arising from the vertebral artery, which in its turn comes off from the subclavian. They join with a succession of small branches which enter the spinal canal through the intervertebral foramina and form median vessels, which run in front and behind the cord along the longitudinal fissure, having numerous horizontal anastomoses. Both of these arteries send constantly fine horizontal twigs into the substance of the cord, while others are distributed to the pia. The capillary network is decidedly denser in the gray than in the white matter.

The occurrence of a hæmorrhage between the membranes of the spinal cord ("intrameningeal"), or between the dura and the bony vertebral canal ("extrameningeal"), is, on the whole, very rare. If one of these two forms occurs more frequently than the other, it is the latter, the extrameningeal, the so-called apoplexia epiduralis, so named because the blood escapes into the epidural space. The hæmorrhages between the dura and the arachnoid—apoplexia subduralis—and those between the arachnoid and the pia—apoplexia subarachnoidalis—which break into the space filled with the cerebro-spinal fluid, are much more uncommon. If we find on the inside of the dura encapsulated foci of variable size which contain products of decomposition, hæmatoidin crystals, detritus, etc., then we speak of a pachymeningitis interna hæmorrhagica. The loose blood coagula may be found of such a size that they compress the cord and the nerve roots. On the other hand, there may be nothing more than punctiform extravasations of blood, in the neighborhood of which the vessels of the dura appear more than usually full. That these coagula are to a certain extent

capable of being absorbed, and that they do not necessarily irreparably damage the cord and the nerve roots, is proved by the cases which take a favorable course.

Ætiology.—With reference to the ætiology, it may be said that such hæmorrhages may be evoked by overexertion. They occur by preference in men, and more especially in laborers who do hard work, such as carrying heavy loads, and who drink a great deal of alcohol. They may also follow traumatic influences, either direct injury to the bodies of the vertebræ or severe concussions affecting the whole body, such as one might receive, for instance, in a collision between two railroad trains, in which case symptoms arise which simulate very much the clinical appearances of railway spine, which we shall describe later. Secondary meningeal apoplexies occur in the course of infectious diseases—scarlet fever, small-pox, typhoid fever, etc. Also in epileptics they are not rare, and, according to Hasse, are often associated with heart hypertrophy.

Symptoms.—The symptoms very closely resemble those of spinal meningitis, only that the onset is always very sudden—"apoplectiform." A person in perfect health may feel suddenly a violent circumscribed pain in the back which differs in degree and extent in different cases, and which if the hæmorrhage is extensive may in a few hours give place to complete paralysis of the legs (more rarely of the arms). In milder cases, while the pains gradually abate, sensory disturbances, paræsthesias and anæsthesias, gradually develop, also slight motor disorders, weakness in the muscles of the extremities, sometimes also signs of motor irritation—trembling, twitching, etc. The main characteristic of a meningeal hæmorrhage which is purely spinal is the complete freedom from disturbances of consciousness. The course and the duration of the disease depend upon the extent of the hæmorrhage and its capability of being absorbed. It is necessary to have seen, carefully studied, and analyzed several cases of this nature in order to properly understand and correctly recognize a new instance. The implication of the spinal cord itself necessarily gives rise to what are known as "spinal symptoms" (increased reflexes, bladder disturbances, persistent paralyses), as we have repeatedly stated.

Diagnosis.—The diagnosis is easy in the cases with characteristic onset if we are satisfied with the diagnosis of "meningeal apoplexy," whereas it is very difficult, nay, often impossi-

ble, to determine the exact kind, whether it is epidural or subdural. Again, to determine its situation is comparatively easy if we remember that in affections of the lumbar cord the legs, bladder, and the rectum mainly suffer, whereas affections of the dorsal region give rise to symptoms of irritation in the distribution of the intercostal nerves, and those of the cervical portion to motor and sensory disturbances in the upper extremities. If the seat be still higher up—in the medulla oblongata—bulbar symptoms, disorders of respiration and deglutition, will not be absent, and the case will be fatal in a short time.

Prognosis.—The prognosis depends upon the extent of the hæmorrhage. Cases with a favorable outcome have repeatedly been observed. Implication of the cord and the nerve roots makes the prognosis more unfavorable.

Treatment.—In the treatment, our first duty in a recent case should be to procure absolute rest in bed and apply ice over the supposed seat of the trouble, to arrest the hæmorrhage, if possible, or to prevent the return of it. If the irritation seems to be localized, local bleeding may be indicated. The further treatment is the same as in acute meningitis.

Tumors of the spinal meninges are of no practical importance, because they can never be diagnosticated with certainty. Although we know well from the report of autopsies that just as in the cerebral we may in the spinal meninges find psammomata, sarcomata, myxomata, gummata, carcinomata, etc., and that their seat may be epidural, subdural, and subarachnoidal, we are never able to recognize definitely from the symptoms observed during life either the nature or the seat of a tumor in the meninges of the cord. The reason is very simple. The tumors, as long as they are very small, produce no symptoms, and, if they grow, give rise to symptoms which depend upon the compression of the cord and the nerve roots and can not be distinguished from those produced by pachymeningitis and leptomeningitis spinalis. They consist, therefore, of signs of motor and sensory irritation and later of paralysis, which vary according to the seat of the tumor. If, for instance, only one half of the cord is compressed, we may have a clinical picture which resembles that of a unilateral lesion of the spinal cord, viz., paralysis and hyperæsthesia on the side of the compression, anæsthesia on the intact side. A case of this kind has been re-

ported by Charcot (cf. lit.). Innumerable variations are possible, according to the size and seat of the tumor, and the less we are able to fully diagnosticate the case during life the more important and instructive it will be to examine and describe as carefully as possible what is found at the autopsy.

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