

DISEASES OF THE SPINAL CORD.

WHAT we have said above about the diseases of the brain holds good, with certain limitations, also for those of the spinal cord. The anatomy of the cord certainly offers less difficulty than that of the brain, and, especially as regards the finer structure of the organ, has been more minutely examined into and is better understood; but in the physiology there exist still so many points, some obscure, some still under discussion, that the pathology remains here also very incomplete. To give a description of the diseases of the spinal cord, especially when questions of its physiology and pathological anatomy are to be discussed, is an extremely difficult undertaking, and were it accomplished far better than I have been able to do it, would still stand in need of a lenient judgment. We shall adopt the same arrangement as in our account of the cerebral diseases, and divide the subject into three parts. The first will contain the diseases of the membranes of the spinal cord, the second those of the spinal or peripheral nerves, the third those of the white and gray matter of the cord.

PART I.

DISEASES OF THE SPINAL MENINGES.

THE spinal meninges are, on the whole, not frequently diseased alone; more often the inflammation spreads from the (soft) membranes of the brain to the pia of the cord, or from the surrounding structures to the dura spinalis. The one of greatest practical interest among the affections of the meninges of the cord is the pachymeningitis cervicalis hypertrophica, which we shall shortly describe.

Of the anatomy but little needs to be added to what has been said on page 3. The spinal portion of the dura is thinner than the cerebral; it widens into a large cylindrical sac, which is by no means filled up by the spinal cord. This dural sac extends beyond the lower end of the spinal cord (conus medullaris), and terminates in a cone-shaped point at the level of the second sacral vertebra; all these are points too well known to be dwelt upon here at length. The conus medullaris ends in the filum terminale, a filiform process which is accompanied by the longitudinal nerve bundles coming from the lumbar and sacral portion of the cord, which constitute the cauda equina. The so-called ligamentum denticulatum is a flat band which by its inner edge is connected with the pia and externally by a toothed edge to the dura mater; the arachnoid lies in such close contact with the dura that the subdural space is only a capillary space, whereas the subarachnoid space, situated between the arachnoid and the pia, is of considerable width. The denticulate ligament divides it, though incompletely, into an anterior and a posterior half. In contradistinction to the pia mater of the brain, that of the spinal cord presents two different layers of connective tissue, the outer one of which, very well developed in man, passes into the sub-arachnoideal trabeculæ, while the inner is made up of a single layer of circular bundles of fibrillæ (Schwalbe) (*vide* Fig. 90).

CHAPTER I.

INFLAMMATIONS OF THE DURA MATER.

PACHYMEINGITIS SPINALIS.

WHILE in the cerebral portion of the dura the inner surface is the usual seat of the inflammation, we find that the spinal dura mater may be diseased on its outer as well as on its inner surface; yet the clinical recognition and separation of these two forms is very often impossible.

The inflammation of the outer surface of the dura, the pachymeningitis spinalis externa, or the inflammation of the

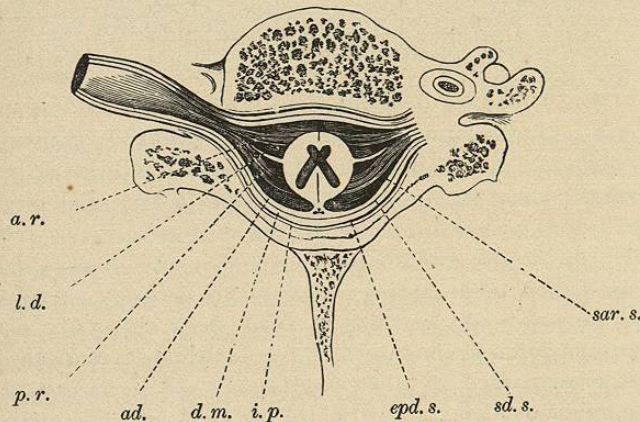


Fig. 90.—CROSS-SECTION THROUGH THE VERTEBRAL COLUMN AND THE SPINAL CORD (DIAGRAMMATICAL). *epd. s.*, epidural space. *sd. s.*, subdural space. *sar. s.*, subarachnoid space. *i. p.*, inner periosteum of vertebra. *d. m.*, dura mater. *ad.*, arachnoid. *p. r.*, posterior spinal root. *l. d.*, denticulate ligament. *a. r.*, anterior spinal root. (After EICHHORST.)

connective tissue between the dura and the vertebral column, peripachymeningitis, is a very rare disease, and probably only occurs secondarily. The inflammatory changes, which at times are most marked on the posterior surface, consist of a thickening and cellular infiltration of the dura; sometimes, also, the membrane may be found covered with dense cicatricial deposits (Eichhorst). The chief causes are caries or tuberculosis of the vertebræ, pleuritis, psoas abscess, syphilis, puerperal pyæmia, suppuration in the peritoneal cavity, and in exceptional cases the disease may have its origin in a neuritis

migrans. The clinical picture depends largely upon the implication of the nerve roots and of the spinal cord. If the cord is compressed by the thickening, the symptoms of a pressure paralysis, to which we shall have occasion to refer later, make their appearance. If the nerve roots are implicated, there are violent paroxysmal pains which run along the vertebral column and radiate into the extremities. Rigidity of the neck and tenderness on pressure over the spinous processes of the vertebræ are rarely absent, but are not sufficient to warrant a diagnosis, as they may be found just as well in an inflammation of the pia. To make a definite diagnosis will in any case only be possible if accompanying signs are taken into consideration, more especially those of any primary disease. It is always a difficult, sometimes even an impossible, task.

The inflammation of the internal surface of the dura mater usually develops in the cervical portion of the cord; following Charcot, who first described the anatomical and clinical

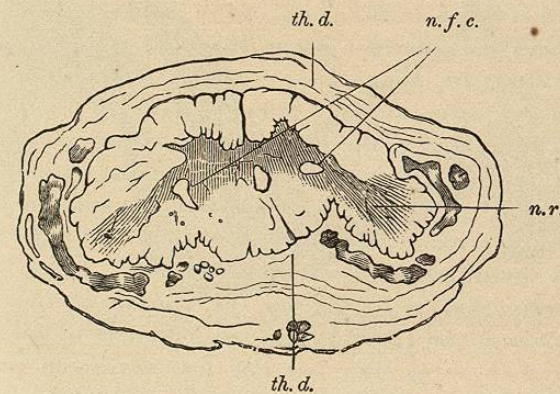


Fig. 91.—CROSS-SECTION THROUGH THE MIDDLE OF THE CERVICAL ENLARGEMENT IN PACHYMEINGITIS CERVICALIS HYPERTROPHICA. *th. d.*, thickened dura. *n. f. c.*, newly formed cavities. *n. r.*, nerve-roots. (After CHARCOT.)

features of the disease, it has been called pachymeningitis cervicalis hypertrophica; the inflammatory new formation and thickening of the connective tissue, which are most marked on the posterior inner surface of the dura, exist in circumscribed areas (Fig. 91); this compresses the nerve roots, which pass through the membrane at these places, and finally even the cord, and may give rise to the formation of channel-like cavi-

ties (*n. f. c.* in Fig. 91). If the compression continues for a considerable time it leads to secondary degeneration of the pyramidal tracts in the spinal cord, as well as of the motor nerves originating in the parts diseased, and to atrophy of the muscles supplied by them.

Symptoms.—The symptoms of the disease are mostly the outcome of the participation of the nerve roots and the spinal cord. The disease may well be divided into two stages, each having its characteristic symptoms. To the first belong the pains, to the second the paralyses (Charcot). The pains vary extremely in intensity and extent; as a rule they are confined to the region of the neck, whence, occurring in paroxysms of increasing severity, they radiate into the upper extremities and are accompanied by paræsthesias in the arms, tingling and formication in the finger tips. The grip is usually markedly diminished, and a test with the dynamometer shows that the patient is able to lift only ten to fifteen kilogrammes. Not rarely trophic disturbances, in the form of vesicular eruptions, roughness and desquamation of the epidermis, are noted. The sensation of stiffness in the neck and of difficulty in moving the head troubles the patient a great deal, and gives to him a stiff, quite characteristic appearance. He carefully avoids turning his head in any direction, and tries to make up for this rigidity of his neck by turning the whole body, which he does slowly and in a somewhat awkward way. The most careful examination of the cervical region, percussion of the spinous processes, hot sponges applied to the skin over them, and the like, does not always reveal an increased sensitiveness.

Gradually, that is to say, in the course of two or three months or more, the patient gets accustomed to his pains, so much the more so as they become less severe in the further course of the disease. On the other hand, he discovers to his great distress that the motor power of his upper extremities is becoming more and more impaired. The stage of paralysis, as a rule, is immediately preceded by a peculiar heaviness and stiffness in the shoulder and elbow joints. The patients notice that they are unable to raise their arms as high as before; if they are females, that they can not arrange their hair themselves any more, owing to the impairment in the upward and backward motion of the arms, movements which finally become totally impossible.

The elbow joint, too, becomes stiffened, and the motions

of the wrist and finger joints become visibly impaired. The disability is not, however, usually equal in both arms and hands, as one hand may be almost useless, while the function of the other is not much interfered with. Still, in some instances, the trouble may progress in both arms *pari passu*. Curiously enough, not all the muscles of the forearms become affected, but more especially those supplied by the ulnar and median nerves, while the extensors, which are supplied by the musculo-spiral, remain more or less intact. The affection of the muscles manifests itself by an increasing atrophy and weakness, which allows an overaction of the healthy antagonists—the extensors—so that the hand, although by no means in all, but only in the well-marked cases, assumes a very characteristic position. It is dorsally flexed, and the fingers, which are bent in the second and third joints, give to it the appearance of a claw (Fig. 92). About the development of this position

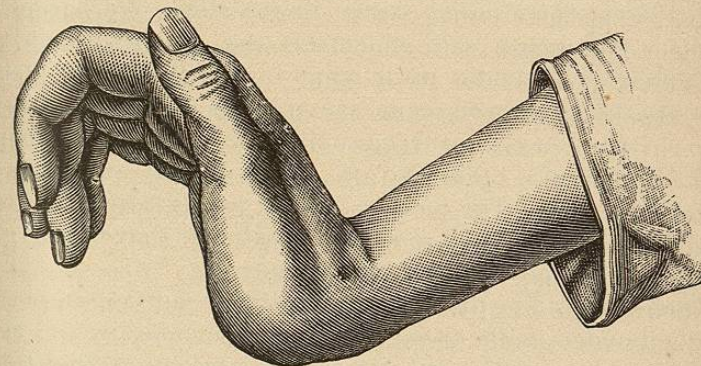


Fig. 92.—POSITION OF THE HAND IN PACHYMEINGITIS CERVICALIS HYPERTROPHICA. (CHARCOT.)

we shall have more to say when speaking of the ulnar paralysis. The difficulties arising from this diminished motor power are considerably aggravated by the paræsthesias in the finger tips. The patients are unable to take hold of small objects—pins, steel pens, etc.—they are unable to attend to their own toilet because they can not feel small buttons, and so forth. They become more and more helpless, and, what is of the greatest significance for patients belonging to the working classes, they become incapacitated for work and unable to earn their living. This may indeed be the case at quite an early period, when the patient is otherwise in a comparatively fair

condition, especially in female patients who do fine hand-work (sewing, knitting, embroidering). The whole condition becomes worse and worse. Arms and hands become stiffer and stiffer, until finally, although not in all instances, a complete paraplegia of the upper extremities develops. Whether or not to these symptoms a paresis or paralysis of the lower extremities or bladder disturbances are added will depend entirely upon the extent to which the spinal cord takes part in the process. It can in no case either be predicted or excluded with certainty.

Course.—The course of the disease is always chronic and extends over years. After the period of pains has passed the patients are, as a rule, free from them forever, and only suffer from the helplessness which results from the motor disturbances. Owing to this they require scrupulous care, have to be dressed, undressed, fed, etc., by an attendant. Recovery or even an improvement is an extremely rare outcome. To be sure, I have seen a cured patient in the clinic of Charcot, but from the minuteness with which this case was described, from the feeling of justifiable pride which accompanied the demonstration, one could well see how extremely rare a cure must be. Remak, too, speaks of the curability of the disease (*Deutsch. med. Wochenschr.*, 1887, No. 26). I myself am unable to present such a case. The patients in my wards, after unsuccessful trials of all proposed modes of treatment, have long given up all hopes of any marked improvement.

Diagnosis.—The disease may, especially in its onset, possibly be confounded with either spinal leptomeningitis or, as we shall later show, with syringomyelia. It is natural that tumors of the vertebral column, if they be situated in the region of the cervical enlargement, should produce in the initial stage the same symptoms as a pachymeningitis. The further course, however, will soon settle the diagnosis. Besides these there are two more diseases which may in the mind of the beginner give rise to some difficulties with regard to the differential diagnosis—namely, progressive muscular atrophy and amyotrophic lateral sclerosis. It is true that a patient with a pachymeningitis may sometimes present the appearance of a man suffering from progressive muscular atrophy; but the two diseases should never be confounded, inasmuch as in the latter affection the initial stage is not accompanied by pain, and the stiff neck has never been known to occur in it. The idea of

amyotrophic lateral sclerosis will probably also be discarded, as in this disease the lower extremities are implicated, and as difficulty in swallowing, a sign which indicates extension of the process to the medulla oblongata, will usually not be very late in appearing. We may say that the diagnosis of cervical pachymeningitis can, if the case is carefully examined and if the course of the affection is taken into consideration, almost always be correctly and definitely made out.

Ætiology.—We are wholly ignorant of the ætiology of the disease. Some maintain that the abuse of alcohol is of some importance in this connection, others the living in damp houses. Whether syphilis has any such influence, and, if so, what is its mode of action, is not as yet established. There is no doubt that the affection is more common among the working classes and the lower grades of society, but what are the conditions and influences which act as direct causes, if such there be, we are not able to say.

Treatment.—The treatment comprises local as well as general therapeutic measures. The former consist in the application of strong counter-irritants—e. g., the painting twice daily with tincture of iodine, in the use of irritative ointments or moxæ. The application of Paquelin's cautery, with which punctiform scars on the skin are produced (the so-called *points de feu* of the French), only deserves preference because it is less painful than the others. Any lasting result can not be expected from it. No more is effected by general or internal treatment, and it is impossible to give the indications for any particular remedy. Iodide of potassium has been used in order that something might be done, without, however, producing anything else than disorders of digestion. If the patient insists on taking medicine, a placebo ought to be given—acids, bitters, etc. In no case were we able to see any beneficial effects from warm baths and hydrotherapy in general. The only measure which at least modified the symptoms somewhat, in that it gave the patients for a time more freedom of motion in their paretic extremities, was electricity, more especially the cutaneous faradization with the brush on the neck as well as up and down the limbs. If the constant current is used it ought especially to be applied to the muscles innervated by the ulnar and median nerves. By repeated closing and opening of the current muscular contractions should be elicited.