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II. Diseases of the Dorsal Nerves.

The anterior (ventral) divisions of the twelve dorsal nerves are called the intercostal nerves, since they run in the intercostal spaces. They supply the intercostal muscles, the levatores costarum, the serrati postici, and the three broad abdominal muscles. To the integument of the chest and abdomen they supply cutaneous branches. The posterior divisions of the dorsal nerves are divided into internal and external branches. The former are distributed to the deep muscles of the back, sending nerves to the rhomboidei and the latissimus dorsi; the latter, passing between the longissimus dorsi and the sacrolumbalis, also furnish numerous muscular branches, and, together with the internal, supply the skin of the back as far down as the crest of the ilium.

The sensory as well as the motor fibres of the dorsal nerves may become the seat of disease, but, and this is practically of much importance, the anterior, the intercostal nerves, are more subject to sensory disturbances, while the diseases of the posterior branches are almost exclusively motor affections.

The disease of the anterior branches, the so-called intercostal neuralgia, is found with relative frequency in the female sex, especially in those of middle age. Ætiologically, occupation and hard work in general are of some importance. Servant girls and women of the poorer classes suffer more

frequently than others. I have seen many such instances, and have found it besides in the course of phthisis pulmonalis when associated with peripheral neuritis. Traumatism, aortic aneurism, and spinal affections, may also give rise to intercostal neuralgia.

The pain appears in paroxysms and attacks more frequently the left than the right side, and almost exclusively the anterior or lateral, rarely the posterior, portion of the nerve trunks. It often follows the course of the nerve and at times reaches a degree of intensity most distressing to the patient. The respiratory movements, more especially coughing and sneezing, cause great agony. Three tender points can usually be demonstrated—one close to the vertebral column, one in the middle of the course of the nerve, and one close to the sternum—called respectively the vertebral, lateral, and sternal points. The fact that frequently after cessation of the pain a herpes zoster appears is of great interest, although the question whether we have to regard the latter as a genuine trophic disturbance or simply as an extension of the inflammation from the nerve endings to the skin, as Gubler thinks, is still unsettled. For the prognosis it is without significance. In all cases of intercostal neuralgia the prospect for complete recovery is slight. Although we may succeed sometimes in cutting short the individual attacks, we can never be certain that they will not recur, and there are persons who all their life long are condemned to suffer from this disease.

The diagnosis is not always simple. Rheumatism of the chest muscles can easily be taken for intercostal neuralgia, and *vice versâ*. In such cases we shall find it useful to observe whether motion has any influence on the pain or whether this exists independently. If there is a history of traumatism, neuritis is always to be thought of, only we must beware of being deceived by malingerers, and to avoid this the condition of the abdominal reflex and the pupil should be examined into. The former in the case of neuritis is increased, the latter often dilated on the side of the pain. This fact was first established by Seeligmüller, and shows that the sympathetic is often implicated here just as in the affections of the brachial plexus (Deutsch. med. Wochenschr., 1887, 45).

In the treatment morphine plays the most important *rôle*, and, as a matter of fact, it is of much more value than the much-lauded subcutaneous injections of osmiumine (one syringeful of a one-per-cent solution at a dose), for this not only frequently disappoints us, but also produces local troubles, small abscesses, etc., so that the patient is left almost in a worse condition than before. The faradic brush, the "*points de feu*" with Paquelin's cautery, blisters applied to the painful points, may be tried; but, on the whole, these means effect but little,

Among the intercostal neuralgias, the so-called mastodynia (the irritable breast of Cooper), a neuralgia of the mamma, is to be included. This is a not very frequent affection of the female after puberty, and may be connected with lactation. It is a very painful and distressing trouble, against which usually all remedies are tried in vain, so that in desperate cases the patient herself suggests amputation of the breast to get rid of the dreadful suffering. The ætiology is obscure. Traumatism is rarely the cause. Ill-fitting corsets may have some influence, but women with well-developed and those with small breasts are equally liable to the affection. The hyperæsthesia of the skin often hinders a careful examination by palpation. With the tips of the fingers we should endeavor to determine whether there are hard nodules in the tissue, which to the inexperienced often suggest beginning carcinoma. In some cases my patients have derived some transient benefit from suspension of the breast and the application of hot cloths. Here also morphine is indispensable (cf. Terrillon, Des neuralgies du sein; Progr. méd., 1886, xiv, 10).

The motor disturbances affecting the muscles of the back supplied by the posterior branches of the dorsal nerves are generally paralyses. We are far from being familiar with the symptoms of the affections of every one of these muscles, and must content ourselves for the present with mentioning the paralysis of the erector spinæ, the sacro-lumbalis, and the longissimus dorsi, which may be affected in the lumbar, dorsal, or cervical portion of the vertebral column. Bilateral paralysis causes curvature of the spine backward (kyphosis), unilateral paralysis lateral curvature (scoliosis). Paralysis or paresis of the erectors in the lumbar region gives rise to a characteristic walk and a characteristic position of the body. The upper part of the body is bent strongly backward, so that the lumbar part of the vertebral column is markedly curved forward. If by any movement the upper part of the body is brought forward so that its centre of gravity is no longer be-

hind that of the whole body, the patient falls forward, or, if the patient sits on the floor, he has the greatest difficulty in getting up. The manner in which he raises himself is so characteristic of paralysis of the erector muscles that we have represented it in Figs. 108 to 111. The patient first gets upon all fours, and then climbs, as it were, with his hands up his own legs, con-

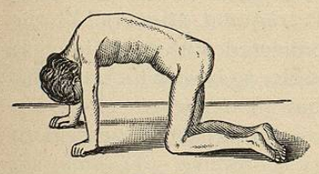

Fig. 108.

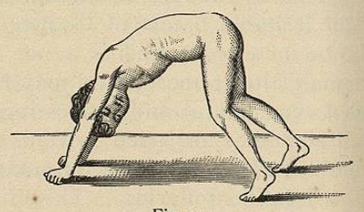

Fig. 109.

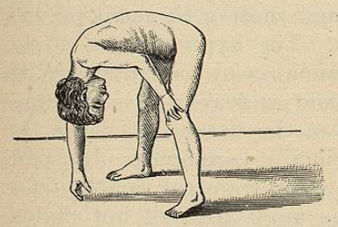

Fig. 110.

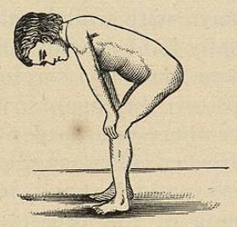

Fig. 111.

Figs. 108–111 illustrate the manner in which a child whose erectores spinæ are paralyzed gets up from the ground. (After GOWERS.)

stantly endeavoring to bring the upper part of the body as far back as possible by movements in the shoulders and the arms so that the abdominal muscles may resume the duty of balancing the body. This mode of getting up can best be studied in pseudo-hypertrophic paralysis.

III. Diseases of the Lumbar Nerves.

The posterior lumbar nerves are, like the dorsal, divided into outer and inner branches, which are distributed to some of the muscles of the back and the skin of the lumbar and gluteal region. The anterior, by far the stouter, are connected each with the corresponding ganglion lumbale of the sympathetic. They form the lumbar plexus which lies behind and in the psoas muscle. Its branches are (Fig. 112): (1) The ilio-hypogastric nerve, for the transversalis and the internal oblique; (2) the ilio-inguinal, for the skin of the pubes and the genitals (N. scrotales et labiales anteriores); (3) the genito-crural, which divides into the external spermatic or genital branch

and the lumbo-inguinal or crural branch, the former supplying the spermatic cord, the cremaster muscle, and the testis, the latter the

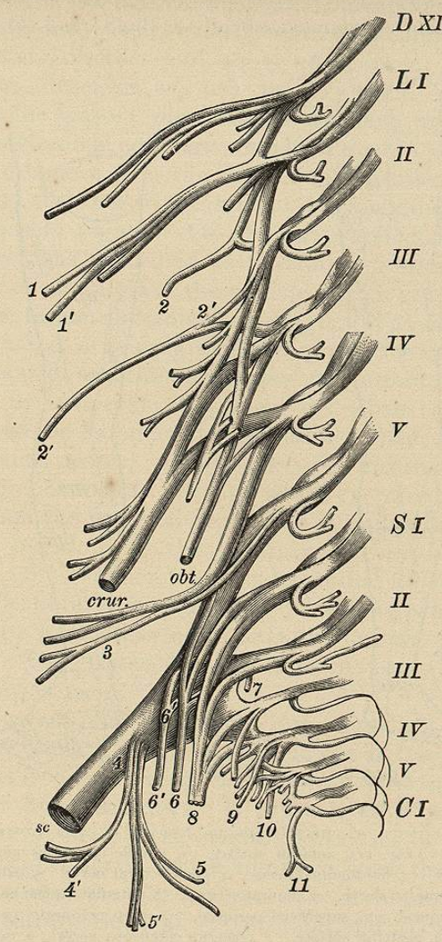

Fig. 112.—DIAGRAMMATIC OUTLINE OF THE LUMBAR AND SACRAL PLEXUSES. *D XII*, last dorsal nerve. *L I–V*, the five lumbar nerves. *S I–V*, the five sacral nerves. *C I*, the coccygeal nerve. 1, ilio-hypogastric nerve. 1′, ilio-inguinal nerve. 2, genito-crural nerve. 2′, external cutaneous nerve of the thigh. *crur*, anterior crural nerve. *obt*, obturator nerve. 3, superior gluteal nerve. *sc*, great sciatic nerve. 4, small sciatic nerve. 4′, inferior gluteal nerve. 5, inferior pudendal nerve. 5′, posterior cutaneous nerve of thigh and leg. 6, 6, branch to obturator internus and gemellus superior. 6′, 6′, branch to the gemellus inferior, quadratus femoris, and hip joint. 7, twigs to the pyriformis. 8, pudic nerve. 9, visceral branches. 9′, twig to the levator ani. 10, perforating cutaneous nerve. 11, coccygeal branches.

skin in the inguinal region; (4) the external cutaneous, for the skin down to the knee; (5) the obturator, which gives off a posterior branch to the obturator ext. and adductor magnus and an anterior branch to the skin of the inner side of the thigh; and (6) the anterior

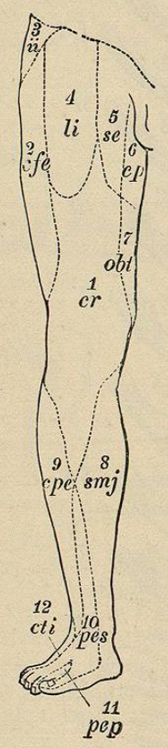

Fig. 113.

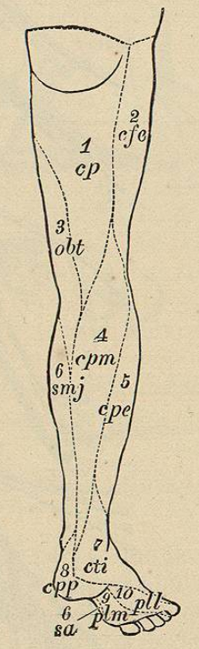

Fig. 114.

AREAS OF DISTRIBUTION OF THE CUTANEOUS NERVES OF THE LOWER EXTREMITY. (After HENLE.) Fig. 113, anterior surface. 1, middle cutaneous nerve. 2, external cutaneous nerve. 3, ilio-inguinal nerve. 4, genito-crural nerve. 5, external spermatic. 6, posterior cutaneous nerve. 7, obturator nerve. 8, internal saphenous nerve. 9, communicating peroneal. 10, superficial peroneal. 11, deep peroneal. 12, communicating tibial. Fig. 114, posterior surface. 1, posterior cutaneous nerve. 2, external cutaneous nerve. 3, obturator nerve. 4, median posterior femoral cutaneous. 5, communicating peroneal. 6, saphenous nerve. 7, communicating tibial. 8, plantar cutaneous. 9, median plantar nerve. 10, lateral plantar nerve.

crural (five millimetres in width), giving muscular branches to the anterior periphery of the thigh and having also cutaneous branches —middle cutaneous, internal cutaneous, and the long or internal saphenous nerve (cf. Figs. 113 and 114).

All the nerves of this plexus contain sensory as well as motor fibres, and hence may be affected in both ways. However, these affections do not often appear independently, whereas they are frequently observed as symptoms of central, more especially of spinal, diseases, and, above all, of tabes. Our description of them, therefore, will here be very brief.

Among the sensory disturbances we have first to mention the lumbo-abdominal neuralgia, in which the hip joint is affected in much the same way as the shoulder joint in cervico-brachial neuralgia, so that the whole lumbar region down to the buttock is intensely painful. Of greater practical importance is what Cooper has described as "irritable testicle," neuralgia spermatica or neuralgia of the testicle, which either only forms a part of the lumbo-abdominal neuralgia, or, as Eulenberg and others assume, is a neuralgia of the sympathetic nerve. The spontaneous pain and the tenderness may attain such a degree as to lead to temporary psychical disturbances. Generally only one testicle is affected, and most of the instances are found in young people. Benda has cured a case of this neuralgia by the application of a bandage which exercised a continuous pressure upon the inguinal region; it is impossible to explain the modus operandi of this measure (Berlin. klin. Wochenschr., 1890, 38). Further, we would mention the crural neuralgia, and the obturator neuralgia, affections which manifest themselves by pain following exactly the course of the respective nerves. The existence of tender points is not constant and their seat varies.

The treatment must be carried out according to the principles which we shall describe later in our account of sciatica.

Even less frequently than the sensory do the motor disturbances occur by themselves. If present, they are mostly of spinal, rarely of peripheral, origin. Paralyses in the distribution of the crural nerve, which interfere with the function of the ilio-psoas and the quadriceps, make it impossible for the patient to bend the thigh at the hip joint and to extend the leg after it has been flexed on the thigh. Paralyses of the obturator nerve interfere with the adduction of the thigh and the patient is no longer able to cross the affected leg over the other. On the other hand, a contracture of these muscles following myelitis may necessitate the resection of the nerve, an operation which may be followed by immediate relief (Lauenstein, Centralbl. f. Chir., 1892, 11). Féré and Perruchet have

published an exhaustive study upon the traumatic origin of neuralgia of the obturator nerve (Revue de Chir., 1889, ix, 7, p. 574). Disorders in the nerves of the gluteus, the tensor vaginæ femoris, and the pyriformis impair rotation of the thigh inward and outward. Abduction is also hindered, while the actions of walking, standing, and more especially climbing stairs, are performed awkwardly. For details the reader is referred to Duchenne-Wernicke, pages 261 and following, where the normal and pathological physiology of these muscles is carefully discussed.

IV. Diseases of the Sacral and Coccygeal Nerves.

The posterior small branches of the sacral nerves, four of which leave the vertebral canal through the posterior sacral foramina and the fifth through the foramen between the sacrum and coccyx, form numerous anastomoses, and thus constitute what is known as the posterior sacral plexus. The anterior, much larger, branches pass into the pelvis, where the first three and a part of the fourth, together with the lumbo-sacral cord (resulting from the junction of the fifth and a part of the fourth lumbar nerves), go to form the (anterior) sacral plexus. The plexus is triangular in form and rests upon the pyriformis muscle. The several nerves unite without much interlacement into an upper, large, and a lower, small, cord or band. The upper is formed by the union of the lumbo-sacral cord with the first and second and the greater part of the third sacral nerves and is continued into the great sciatic nerve. The lower becomes the pudic nerve. The plexus gives origin to a number of collateral branches—the superior and inferior gluteal, the small sciatic, and perforating cutaneous nerves and branches to the pyriformis, obturator internus, gemelli, and quadratus femoris. The great sciatic nerve, the largest nerve of the body, divides into the internal popliteal and external popliteal or peroneal, the latter again dividing into the anterior tibial and musculo-cutaneous, the former, which becomes the posterior tibial, terminating in the internal and external plantar nerves. The pudic nerve divides into the inferior hæmorrhoidal, the perineal nerve, and the dorsal nerve of the penis or clitoris.

The anterior branch of the coccygeal nerve is distributed to the integument over the back part and the side of the coccyx. It is joined by a branch from the fifth sacral nerve, while the posterior division is lost in the fibrous structures on the back of the coccyx.

The affections of the sacral plexus, which appear independently of any other disease, are chiefly sensory in nature. Motor disturbances, although they are perhaps numerically as common as the former, are in the great majority of instances symptomatic of spinal disease. Careful studies upon the lesions of the sacral and lumbar plexus have been published by Charles K. Mills, in the Medical News, June 15, 1891.

Sciatica.

Among the sensory disturbances there is especially one disease which, owing to its relative frequency and obstinate resistance to treatment, has attained to much practical importance—namely, the affection of the sensory fibres of the sciatic nerve, the sciatic neuralgia or sciatica, malum Cotunnii (Cotugno, 1764). This may, as autopsies have shown, be due to an organic disease of the nerve, a genuine neuritis, or to a functional neurosis. In the former there exist varicose dilatations of the blood-vessels of the nerve, swelling, increase in volume, alterations in consistency, and a collection of serous exudation in the nerve sheath (Cotugno, Jasset). In the latter no anatomical changes can be detected. The neuritis may be due to disease of the neighboring structures, to a tenosynovitis in the lower leg (Erb), to affections of the vertebræ (spondylitis, carcinoma), or may appear independently, in which case, leaving cold out of consideration for a moment, we have usually to deal with mechanical injuries, either as the consequence of wounds, fractures, or as the result of protracted pressure (tumors of the pelvis, aneurisms, hernia, uterus gravidus, engorgement of the venous plexus of the pelvis, habitual constipation, etc.). The occupation must, moreover, be taken into consideration in the ætiology of sciatica. It may exert an injurious influence in one of two ways, either through the overexertion which it entails or through the exposure to frequent sudden changes of temperature. Of the former we have instances in those who work with the sewing machine for weeks and months for several hours a day, and in those who are always lifting heavy weights (stevedores, blacksmiths, etc.). To this class is thought to belong "*le lumbago des forgerons*," described by Maisonneuve (Hirt, Krankheiten der Arbeiter, iv, 90). Of the latter we have instances in puddlers and those who work at smelting furnaces, etc. Sciatica is frequently seen among such people, and seems to affect more commonly the left leg, probably because in throwing the coal into the furnace it has to be extended more forcibly (Chiene, of Edinburgh, and Hirt).