

CHAPTER II.

LESIONS OF THE BRACHIAL PLEXUS.

THE brachial plexus may be diseased in its supra- or infra-clavicular portion. The affections of the latter, undoubtedly the more frequent, are of greater practical importance than those of the former.

Here, too, the motor disturbances are more prevalent, sensory disturbances in the region of the brachial plexus, especially neuralgias, being decidedly exceptional. In a case reported by Stern (*Berliner klin. Wochenschr.*, 1891, 46), the compression exerted by a bandage had produced an affection of the whole brachial plexus, with consequent arrest in growth and extensive atrophic paralysis.

In the supraclavicular portion, the posterior thoracic—which, coming from the fifth and sixth cervical nerves, supplies the serratus magnus—is affected in an interesting and very striking manner.

The so-called serratus paralysis is quite frequently due to the calling of the patient, as certain occupations seem particularly to predispose to it. If prolonged pressure is frequently exerted on the nerve—as, for instance, is the case in people who carry heavy loads on their shoulders, or if the shoulder muscles, especially the serratus, are overexerted, as happens, for instance, in mowing, in certain manipulations of tailors, shoemakers, etc.—the paralysis has been known to develop rapidly. Occasionally such ætiological factors are absent, and we are forced to fall back upon the still obscure influence of what is called “catching cold.”

The condition is quite characteristic whether the arm be in a state of motion or at rest. In the latter position the scapula appears elevated and approaches with its lower angle the vertebral column more than normally, the inner median margin having an oblique upward and outward direction. The cause

of this deformity is to be sought in the overaction of the antagonists—the rhomboids, the levator anguli scapulæ, and the trapezius (Fig. 94). On moving the arm, the patient, we find, can raise it only to the horizontal position, owing to the absence of the action of the serratus, which pushes the scapula forward. As soon as we produce artificially the action of this

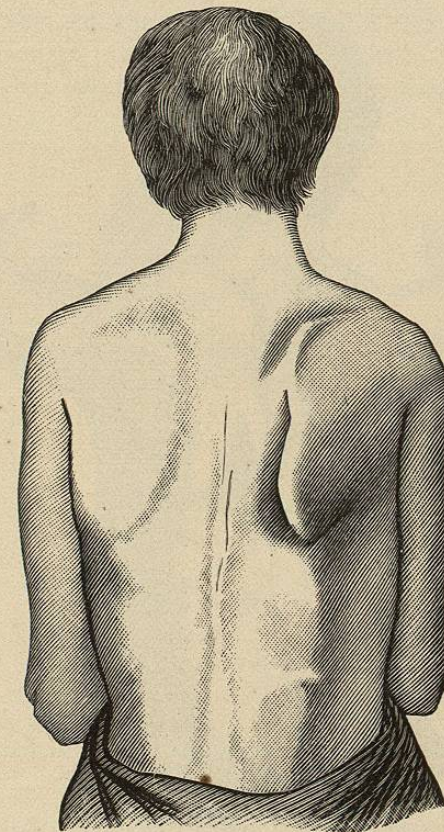


Fig. 94.—CASE OF RIGHT-SIDED SERRATUS PARALYSIS IN A MAN THIRTY-FIVE YEARS OF AGE. Position of the scapula with the arm hanging down. (After EICHHORST.)

muscle by fixing the shoulder blade and pushing it forward, complete elevation of the arm is possible. If the patient attempts this same motion himself the scapula is approached to the spinal column. If the arm is raised in front of the chest the inner edge of the scapula is elevated and stands off from the thorax in a winglike fashion, so that we are able to touch the inner surface of the bone (Fig. 95). Besides a moderate

impairment in adduction, which somewhat interferes with the folding of the arms across the chest, there are no other abnormalities to be mentioned. Especially is it to be noted that there are no decided sensory changes to be perceived in a pure serratus paralysis. As this affection is not rarely met with in the course of progressive muscular atrophy—sometimes this dis-

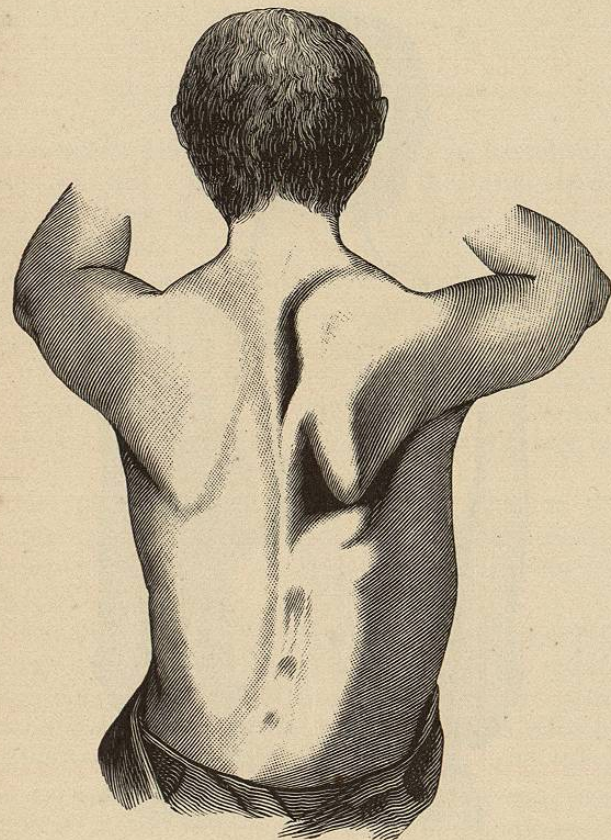


Fig. 95.—THE SAME CASE WITH THE ARMS RAISED.

ease begins with a serratus paralysis—it is not to be wondered at that the muscle at fault is sometimes found to be wasted. In the traumatic paralysis the atrophy comes on very late—many years after the traumatism. The muscle remains intact, electrical reactions are normal—reaction of degeneration being by no means always demonstrable—and yet there is no improvement. The prognosis, on the whole, is bad; the disease even

in the most favorable cases is of very long duration, and may last for weeks, months, or years. Often it is not curable at all, and the patient is, as it were, maimed for the rest of his days.

Not too much hope ought to be placed in the electrical treatment, no matter in what form electricity be employed; in grave cases, at least, such hopes are doomed to disappointment.

The paralyzes of the pectoralis major and minor (anterior thoracic nerves), of the rhomboidei and the levator anguli scapulæ (muscular branches from the third, fourth, and fifth cervical nerves), of the latissimus dorsi, subscapularis, and

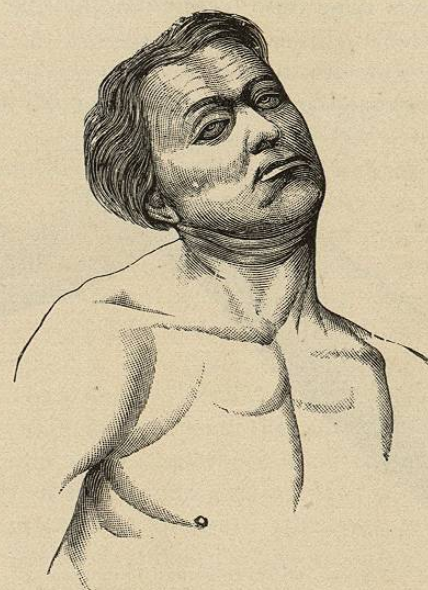


Fig. 96.—POSITION OF THE HEAD IN SPASM OF THE SPLENIUS CAPITIS ON THE RIGHT SIDE.

teres major (subscapular nerves), finally, those of the supraspinatus and infraspinatus (suprascapular nerve), have by themselves no practical importance, although isolated affections of the last nerve have, of late especially, been repeatedly observed. Thus Bernhardt has reported an instance occurring after contusion of the shoulder joint (Erlenmeyer's *Centralbl. f. Nervenheilk.*, 1889, 7); F. Schulze, a case in which the affection was produced during birth (*Arch. f. Gynäc.*, 1888, 3); Sperling, one in which, after neuritis of the whole brachial plexus, an improvement took place in all branches except the

suprascapular (Neurol. Centralblatt, 1890, 10); finally, Beuzler has reported a case in which he found atrophy of the muscles supplied by this nerve (Deutsche med. Wochenschrift, 1890, 51).

Spasms of the muscles concerned here are also unusual. A characteristic position of the head is evoked by a unilateral spasm of the splenius capitis (Fig. 96). Bilateral spasm of the deep muscles of the neck produces a strong retraction of the head, while spasm of the rhomboids alters the position of the shoulder blades, etc.

Of the nerves belonging to the infraclavicular portion of the brachial plexus none is so frequently the seat of disease as the continuation of the posterior trunk of the plexus, which becomes the musculo-spiral or radial nerve, and supplies the skin and the muscles of the extensor surface of the arm.

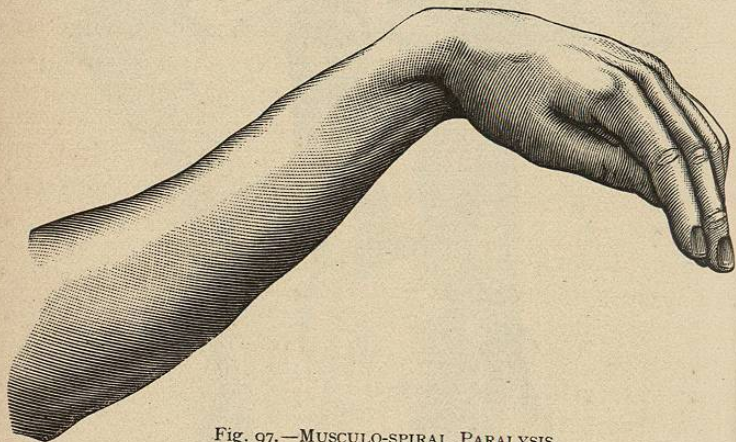


Fig. 97.—MUSCULO-SPIRAL PARALYSIS.

The musculo-spiral paralysis can better than any other form be recognized at a glance. A patient with paralysis of the extensors is unable on stretching out the arm to raise the hand, while lateral motion is difficult. Dorsal flexion, which is performed by the extensor carpi radialis and the extensor carpi ulnaris, is impossible, abduction and adduction difficult, the hand hangs down flaccidly ("wrist-drop," cf. Fig. 97), and when rested upon the table can not be raised. On a more careful examination it is noticed that the first phalanx of the flexed fingers can not be extended without assistance, but that if this phalanx is passively extended the patient can straighten out the others himself. The first condition is due to the paralysis of the extensors, which, as is well known, on the dorsal

surface of the first phalanx pass into an aponeurosis; the second to the preservation of the function of the interossei, which are supplied by the ulnar nerve. Since its extensors are also implicated, the thumb, of course, can not be actively extended, neither can it be abducted, because the muscles concerned are also paralyzed. Some interesting conditions will be found on examination of the forearm in extension and flexion. If, for instance, the forearm is extended and pronated, supination is impossible, because the supinator brevis is paralyzed. During flexion of the forearm, however, the biceps, which is intact, can perform supination without difficulty. If the forearm is in a position of supination it is easily flexed by the intact muscles, the biceps and the brachialis anticus, while if it is half pronated flexion is imperfect, owing to the paralysis of the supinator longus. The characteristic prominence formed by the belly of this muscle when the forearm is flexed is absolutely wanting. Any participation of the triceps in the paralysis is only observed if the lesion is high up ("crutch palsy"). Usually the injury is situated where the nerve turns over the humerus or lower down, in which case naturally the normal function of the triceps is not interfered with. Isolated paralysis of the triceps is very rare; a case of this kind has been published by Oppenheim (Berlin. klin. Wochenschr., 1889, 44). The patient was a weaver, and the affection was regarded as having been due to his occupation. Permanent trophic disturbances, shown by pronounced wasting of the affected muscles, are rare in cases of pressure paralysis, while they are frequent in the paralysis developed as a consequence and in the course of lead poisoning.

The flexors, otherwise perfectly healthy, also become weakened, because their points of insertion are approximated to the points of origin more closely than under normal conditions, on account of the constant drooping of the hand, and hence the interference with motion is aggravated. The patient can hardly use the hand at all; he is unable to take hold of anything, the finer manipulations necessary for writing, drawing, etc., are impossible, and in the majority of cases he is unfit for work or for making a living during the whole course of the disease.

Sensory changes are rarely sufficiently marked to add much to his troubles. Sometimes paræsthesias may be complained of—a feeling of cold, numbness, formication, and the like;

sometimes, also, there is a distinct decrease of sensibility, so that zones of anæsthesia can be made out. Pagenstecher has published the results of his study of these conditions in an article (*Arch. f. Psych.*, 1892, xxiii, 3, p. 838), in which will also be found a careful collection of references to the literature. On the other hand, a source of great annoyance is found in the peculiar painless swellings of the extensor tendons on the back of the hand. These node-like swellings have been described by Gubler as *tenosynovitis hypertrophica*, and are to be attributed to mechanical influences acting injuriously on the tendon.

The duration and course of a musculo-spiral paralysis may vary greatly, and it is often hard to give an opinion on these points at the very onset of the affection. An electrical examination, which reveals the reactions of the muscles and nerves to the faradic and galvanic current, is the only means by which we can arrive at an opinion as to the duration of the disease. The conditions are the same as those we described as existing in facial paralysis, and it suffices, therefore, to refer the reader to that chapter. But here again be it stated, a prognosis should never be given without a previous electrical examination of nerves and muscles.

The ætiology of musculo-spiral paralysis is interesting from the fact that it is fairly well understood. While, as all confess, the cause of most nervous diseases is absolutely unknown, and we therefore are forced to fall back on uncertain explanations, such as exposure to cold, it seems, according to our present knowledge, that musculo-spiral paralysis always can be traced back to one or two kinds of causes, viz., mechanical or chemical. There are quite a number of lesions due to mechanical or traumatic causes. Frequently a man, when greatly fatigued, drunk, or exhausted, goes to sleep, using his arm, usually the left, as a support for his head; the latter, pressing on the nerve in the lower third of the humerus, gives rise to an injury in a relatively short time, or the arm supporting the head of the sleeper may press with its outer side against a chair or the like and a paralysis be the result. This is the so-called "sleep palsy." Next we have compression happening to the patient as a consequence of his daily occupation, due to pressure from ropes, handles of water-jars (as in the water-carriers' paralysis of Rennes), etc.; sometimes in infants this paralysis occurs from too much compression

on the arms by too tight swathing-clothes; sometimes too tight plaster-of-Paris bandages have been the cause; and, finally, all direct injuries to the nerve—stab wounds, blows, gunshot wounds, and compression of the nerve by abnormal callus formation after fracture of the humerus—must also be mentioned.

The lesions due to chemical causes may be the result of the action of certain poisons, among which lead deserves to be mentioned first. It is a fact no less remarkable than well authenticated, to which we shall again refer when speaking of lead poisoning in general, that this agent acts by preference

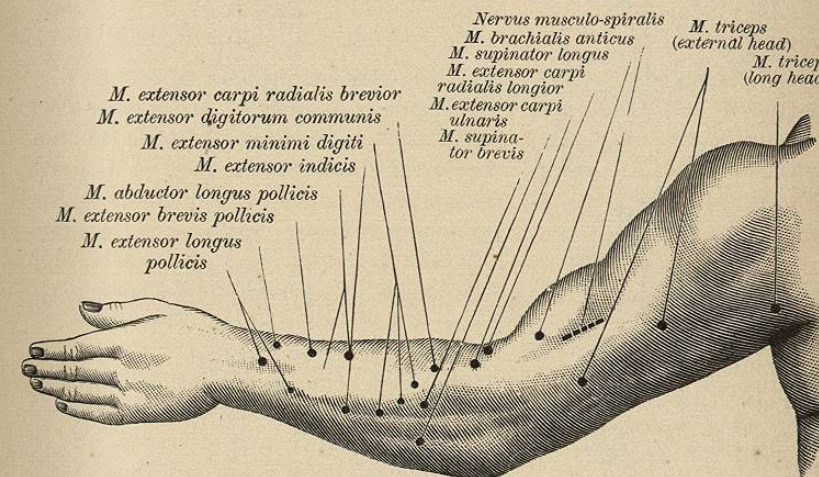


Fig. 98.—MOTOR POINTS OF THE MUSCULO-SPIRAL NERVE AND THE MUSCLES SUPPLIED BY IT.

on the muscles which are supplied by the musculo-spiral nerve. This musculo-spiral paralysis, however, unlike the form which is produced by mechanical action, is not an independent disease, but merely a symptom of a general intoxication. According to the commonly received opinion (Leyden and others), the paralysis depends upon a degenerative atrophy of the motor peripheral nerve fibres, to which is often superadded a spinal affection. It differs in its clinical aspect from the mechanical lesion, inasmuch as the supinator longus and the triceps remain intact. Of late years several cases have been published where, after subcutaneous injections of ether into the extensor surface of the forearm for therapeutic purposes, a musculo-spiral paralysis appeared (Falkenheim, Arnozan, Remak, H. Neumann,

cf. lit.). In using the drug in this way this possibility ought to be thought of.

In contradistinction to the frequency with which paralysis is found, signs of irritation in the distribution of the musculo-

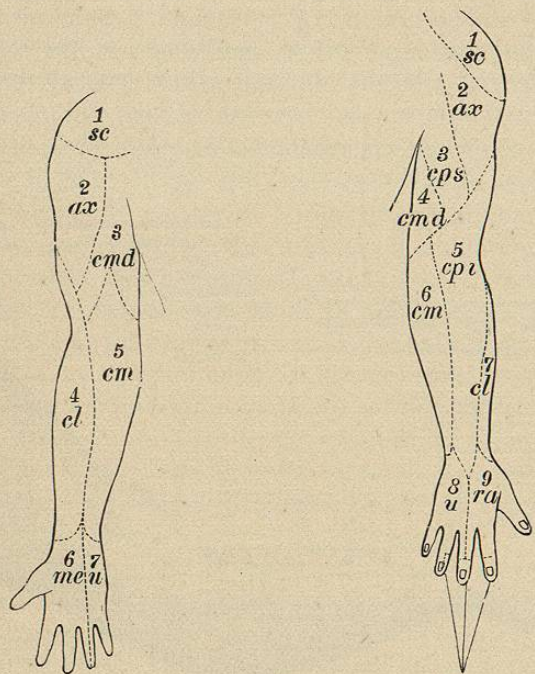


Fig. 99.

Fig. 100.

THE DISTRIBUTION OF THE CUTANEOUS NERVES OF THE ARM AND HAND. (After EICHHORST.) Fig. 99, volar surface of the upper extremity. 1sc, supraclavicular nerve. 2ax, circumflex nerve. 3cmd, internal cutaneous nerve. 4cl, external cutaneous nerve. 5cm, cutaneous medius. 6me, median nerve. 7u, ulnar nerve. Fig. 100, 1sc, supraclavicular nerve. 2ax, circumflex nerve. 3cps, superior posterior cutaneous nerve. 4cmd, internal cutaneous nerve. 5cpi, inferior posterior cutaneous nerve. 6cm, median cutaneous nerve. 7cl, external cutaneous nerve. 8u, ulnar nerve. 9ra, musculo-spiral nerve. 10me, median nerve.

spiral nerve—that is, spasms—are extremely rare. They have been observed most often after manual overexertion—gymnastics, etc. (Hochhaus, Deutsches med. Wochenschr., 1886, 47; Laqueur, xiv. Wanderversammlung der südwestdeutschen Neurologen, Arch. f. Psych., 1889, xxi, 2, p. 660).

In the treatment, electricity not only plays the chief, but the only rôle. From the motor points (Fig. 98) the muscles ought to be stimulated with the constant current, and, besides this,

frequent extensive applications of the faradic brush to the skin of the affected arm ought to be practiced. That the cause, if such should be present—for instance, pressure of crutches, of dislocated bones, etc.—ought to be removed, is self-evident. Heusner (Barmen) demonstrated before the Association of Naturalists in Halle (1891) an apparatus by means of which the action of the extensors is replaced by rubber cords; this apparatus has proved to be satisfactory. The sensory disturbances which may be found in the distribution of the musculo-spiral we shall mention when considering cervico-brachial neuralgia. The mode of distribution of the cutaneous nerves of the upper extremity is illustrated in Figs. 99, 100, 101.

The median and ulnar nerves supply together the innervation of the muscles and the skin of the inside of the forearm and the hand, the former innervating almost all the flexors of the forearm, the pronator radii teres, and the pronator quadratus, the flexor carpi radialis, the flexor sublimis digitorum, and a part of the profundus, leaving the flexor carpi ulnaris to the ulnar. Among the thenar muscles the median supplies the abductor brevis, the opponens, the outer head of the flexor brevis, further, the first three lumbricales, while it again leaves to the ulnar, besides the one flexor mentioned, the antithenar, the adductor brevis pollicis, the deeper head of the flexor brevis pollicis, the fourth lumbricalis, and all the interossei.

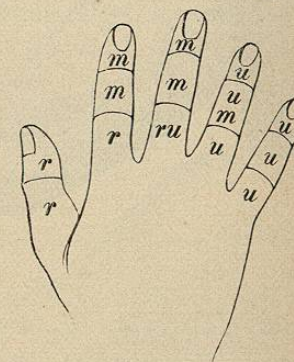


Fig. 101.—DISTRIBUTION OF THE SENSORY NERVES ON THE BACK OF THE FINGERS (KRAUSE). r, musculo-spiral nerve. u, ulnar nerve. m, median nerve.

Both nerves have this in common: that they only rarely become affected by themselves, much more rarely than the musculo-spiral, and that they are, unlike the latter nerve, liable to disturbances not only in their motor but also in their sensory fibres. We shall have to speak, therefore, not only of paralyses, but also of neuralgias. With regard to the ætiology, we may consider it as the rule, just as in musculo-spiral paralysis, that motor disturbances only occur as a consequence of mechanical injury, provided there be no other disease present—e. g., progressive muscular atrophy and the like; while neuralgias may appear under other circumstances—e. g., after acute diseases, after exposure to cold, sometimes also without any