

## TWO CASES OF GANGLIA IN THE SHEATH OF THE PERONEAL NERVE

BY  
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In the following I shall report two cases of paralysis of the peroneal nerve, the anatomicopathological cause of which proved to be a strange cystic degeneration of the nerve sheath. The text-books of pathology and neurology which the author has consulted say nothing about this condition, but several cases of the same nature have been reported in the periodicals. *Sultan* of Kiel, in the *Zentralblatt f. Chir.* 1921, No. 27, reported a case of »Ganglion der Nervenscheide des N. Peroneus«. In this case there was a typical paralysis of the peroneal nerve, however with unimpaired tactile sensibility. There was violent pain of the lateral side of the crus + hypalgesia. The nerve was exposed, and two thickened spool-shaped bodies, half the size of a bean, were found like beads on a string. They proved to contain a glass-like, thickly gelatinous substance. The nerve was severed from these bodies with the result that the pain disappeared, but paresis and hypalgesia remained. Morbid anatomy diagnosis: chronic inflammation of the peri- and endoneurium with exudation. »Die Nervensubstanz selbst erscheint in den excidierten Fasern intakt«. *Hartwell* of Boston (*Med. and Surg. Journ.* 1901, No. 24) has previously reported a case of a cyst, the size of a hazelnut, in the median nerve with impaired mobility of the forearm and loss of sensibility to pain and touch. On operation the cyst proved to contain a watery and mucoid substance. Complete restitution and freedom from recidivation after 8 months.

*Loeffler and Volkmann*, in the *Zentralblatt f. Chir.* 1920 No. 44, report »Ein seltener Befund bei angeblichen Plattfussbeschwerden« (Ganglion der Nervenscheide des Tibialis). This was a case of persistent flat-foot which did not yield to treatment with valgus-pads. Between the Achilles tendon and the medial malleolus a thickening, the size of a pea, was found, which on pressure gave rise to radiating pain in the foot. On operation a swelling, 1—2 cm. large, was found, apparently originating from the nerve sheath but not having penetrated the nerve. —

The swelling was cystic, »leicht höckerig«, of a tense (prall) consistence and consisted of a number of cystic cavities from which a gelatinous watery substance was discharged. It was removed without injury to the nerve. The troubles disappeared completely. Microscopical examination: »Es handelt sich also um eine vom Bindegewebe der Nervenscheide des Tibialis ausgehende wahrscheinlich traumatisch bedingte Erweichungscyste, ein Ganglion«.

*Chodkow*, in the *Moskowski medicinski journ.* 1925, No. 5 (abstract in the *Zentralblatt f. Chir.* 1926, p. 680), describes »Ganglien der periferischen Nerven«. His case had a cylindrical swelling, 6—7 cm. long and 1 cm. thick, in the lower third of the radial side of the right forearm, which was supposed to be a hygroma from a tendon sheath. Operation and histological examination revealed a swelling of the ganglion type, originating from the nerve sheath of the ramus dorsalis nervi radialis. It seems as if there have been no nerve symptoms in this case.

In the *Zentralblatt f. Chir.* 1926, p. 2551 a lecture by *Zaar* of Halle is reported: »Ueber Ganglien in der Nervenscheide«. He describes how, in a man aged 22 years, who had suffered from symptoms of paralysis in the left crus for 2 months, severe motory, sensory and trophic disturbances occurred in the whole of the peroneal extension, the cause of which was supposed to be a tense, elastic tumor, 1 inch thick, situated in the common peroneal nerve at the level of the capitulum fibulae. In the perineurium *Zaar* found a cystic tumor with one cavity, contain-

ing a watery gelatinous substance. Nothing is mentioned about the result in the abstract.

I shall now report my two cases.

*Case No. 1.* No. 155/1922. A. E., a foreman, aged 36. Admitted to the Orthopedic Clinic at Lund from May 18th to June 16th 1922 under the diagnosis of *Pes equinus paralyticus* (*Degeneration et paralysis nervi peronei profundi dx.*).

*Anamnesis:* the patient is a married man and the father of 2 children. His wife has had no miscarriages. As far as he knows he has had no intoxications. He is a teetotaller. Has had diphtheria once when he was a boy and once at the age of 19. »Spanish gripp« in 1918 recovered after a week. Otitis in 1919, antrotomy. Has never before suffered from limpness or paresthesia of the right leg. On Sept. 15th, 1921, he fell into a pit, 1 m. deep, his right leg coming under him, whereby the anterior aspect of the middle of the crus was pressed against a stone lying in the pit. Besides a sharp, local sensation of pain he had the sensation of a band giving way in the parts corresponding to the anterior aspect of the crus down to the dorsal aspect of the foot. After half an hour he was able to walk, but he noticed that the foot was limp and that there appeared a considerable swelling across the middle of the anterior aspect of the crus and later on blue discoloration. As he was cycling half a mile two hours after the trauma his foot slipped several times on the pedal: »he had no control of it«. Already the same evening intensive pain began in the right leg from the lateral knee region and down to the foot. The pain remained and interfered with his sleep for 4 weeks. In December of the same year he was tolerably free from pain and was able to walk better, but the foot was limp as before. In January 1922 he resumed work, which caused a gradual aggravation of the pain; in April it was rather severe sometimes and was felt as before from the capitulum fibulae downwards, medial and lateral on the dorsum of the foot, but was moreover felt now in the back of the thigh. About the 15th of May the intensity of the pain increased very much, especially in the back of the thigh. During the first period of the disease there was no tenderness on palpation of the peroneal nerve from

the capitulum fibulae and up the thigh. About the 20th of Oct. 21 the practitioner is said to have diagnosed a swelling of the peroneal nerve at the capitulum fibulae.

*The patient's condition on May 18th, 22:* the patient is of a stout build. The heart: 0. The lungs: 0. Urine: nothing abnormal. Nerves: cranial nerves: nothing abnormal. Reflexes somewhat lively. Babinski's sign negative. No skin tumors or abnormal pigmentation.

*The right foot* is plantiflexed and cannot be actively dorsiflexed. The patient cannot extend the toes. The pronating and supinating power is good. The tendon of the anterior tibial muscle is not tensed during these movements. Passive movements of the joints of the foot do not give rise to any remarks. There is atrophy of the muscles on the anterior aspect of the crus (tibialis ant. and the extensors). Marked sensory disturbance in the part of the skin between the first and second toe supplied by the nervus peroneus prof. Otherwise intact sensibility. At the capitulum fibulae a considerable thickening of the peroneal nerve can be felt and there is some tenderness, even in the back of the thigh. The Wassermann reaction is negative in the blood.

*Operation on May 20th. (Frising).* A lateral incision is made parallelly to the anterior crest of the tibia. The anterior tibial muscle and the extensors are atrophic but without marked discoloration. The nervus peroneus profundus is exposed and is seen and palpated without demonstrable alteration. Another incision is made in the skin at the capitulum fibulae up the back of the thigh. From the place where it enters the muscular canal below the capitulum fibulae and up to the region of the gluteal fold the peroneal nerve is considerably thickened and unevenly swollen, resembling a rosary, with a blueish discoloration of the swellings. The nerve is divided in its entire length from below upwards, whereby the whole chain of small connected cysts is opened. The contents of these cysts proved to be a clear, gelatinous substance, which was of a yellowish colour in the lower portion and of a more marked reddish colour in the upper portion. The whole of the part of the nerve in which alterations are demonstrable is split in this manner, and the

cysts are scraped out. The peroneal nerve runs along but separated from the tibial nerve, at least up under the gluteal muscles. The cystic alteration occupies the part of the nerve that runs along the biceps and at the greatest distance from the tibial nerve, thus apparently corresponding to the *nervus peroneus profundus*. The part of the nerve that remains after splitting and scraping is thus made up of the part adjoining the tibial nerve, thus corresponding to the *nervus peroneus superficialis*. The latter is felt to be of an even thickness and of a normal consistence. The tibial nerve proves to be normal in every respect. A piece of the thin cystic wall is excised for microscopical examination.

*Anatomicopathological examination* (Sjövall): The excised part displays firm connective tissue, perhaps somewhat rich in cells, which in some parts is decaying with a poor vitality and a coloration reminding of the presence of mucus.

*Skiagrams* of the right knee-joint and crus show completely normal pictures everywhere. June 15th: the wound healed by first intention. The pain in the back of the thigh ceased rather early after the operation. The paralysis remains unaltered. The patient states the sensory disturbances have diminished, which, however, seems to be doubtful. Splint for drop-foot. The pt. discharged.

During the following year the patient noticed that on exertion there appeared a nodule behind the capitulum fibulae in the lower angle of the cicatrice, which caused rather considerable pain and did not disappear until he had had some days' rest. The patient was moreover troubled by queer sensations of pain along the whole course of the sciatic nerve, tenderness of the gluteus medius and pain in the calf after exertion. He was re-admitted in August 1923. Present condition: at the site of the nodule referred to an elastic resistance, the size of a Spanish cob-nut, is felt; it is not tender. The coarse muscular power of the muscles of the thigh and the calf and of the flexors or the toes is good. But the muscles supplied by the *nervus peroneus profundus* lack their function completely. The coarse power of the peroneal muscles is markedly diminished. The nodule at

the capitulum fibulae referred to above was excised and appeared to consist of connective tissue with small cystic cavities filled with a thin, gelatinous fluid and with microscopically scanty nervous elements.

The patient was examined at the clinic on two more occasions at intervals of 1—2 years, viz. on Sept. 2nd, 1924, and on Sept. 10th, 1926, and his condition proved to be the same as in August 1923.

*Case No. 2.* No. 422/30. K. A., aged 48. Farmer. Admitted to the Orthopedic Clinic from June 21st—Aug. 7th, 1930, under the diagnosis of *Pes equinus paralyticus dx.* (*Cysta nervi peronei*).

*Anamnesis:* His parents are in good health. 7 brothers and sisters in good health. Has had scarlet fever and »Spanish grippe« when he was a boy, but otherwise he has always been in good health. He is a bachelor but denies venereal disease. Has never before suffered from paralysis or had any trouble whatever with his right foot. In the beginning of May 1930 he had pain for 1—2 weeks in a part, the size of a palm, of the right crus immediately below the capitulum fibulae. Gradually he noticed a feeling of numbness in the dorsum of the foot and noticed that the foot began to drop more and more during gait. Sometimes he had a burning sensation in the dorsum of the foot. This condition remained unaltered during the month that passed until the patient was admitted. He cannot remember even the slightest trauma of the leg.

*Condition* on admission, June 21st, 30: General health satisfactory. Internal organs normal.

The patient walks with drop-foot, the foot being distinctly adducted. He is unable actively to dorsiflex the foot, but can abduct and adduct and perform a powerful plantiflexion. When the toes are flexed they can be extended to the normal position but with poor muscular power. The passive mobility is completely unimpaired.

*Sensibility:* on a long but very narrow area on the dorsum of the foot and the crus (corresponding to the whole skin area supplied by the peroneus) he cannot feel a slight touch by

means of cotton-wool and can only incompletely distinguish the head of a pin from the point.

*Reflexes:* the patellar reflexes cannot be elicited, the tendon Achilles reflexes are lively, the reflexes of the sole of the feet are normal. The tendon reflexes and periosteal reflexes of the abdomen and the arms are normal. Laterally, below the capitulum fibulae the peroneal nerve is felt to be thickened for about 4 cm., it is approximately as thick as a pencil, somewhat tender, giving rise to pain in the toes on pressure over a certain point.

Sedimentation test: 2 mm/1 hour. Blood-pressure 130 mm Hg. Wassermann's test is negative in serum. Kahn's test negative.

Skiagram: the upper part of the right crus normal.

*Operation June 27th (Frising):* exploratory exposure of the peroneal nerve and extirpation of the cyst. The nerve is first exposed distally to the capitulum fibulae. The subcutis and the tissues surrounding the nerve are found to be firm and cicatricial, reminding of a resorbed haematoma. In the perineurium a long cystic body is found, which is of the size of a little finger at the utmost. It is excised together with the perineurium, but as far as can be seen without any nerve fibres attached. The cyst, which bursts, discharging a clear, yellow gelatinous fluid, is traced down between the peroneal muscles. Where the deep branch disappears among the extensors the cyst turns off, disappearing among the muscles in the direction of the knee-joint. The deep branch is of a thin, atrophic appearance, but otherwise the peroneal nerve — as well as the muscles — is of a normal appearance. The muscular branches are irritated by means of the faradic current, whereby distinct contractions are seen in the respective muscles. The cyst does not extend up the thigh. Exact skin sutures. Fixation by means of a splint with the foot in dorsiflexion. Healing by first intention. The patient was treated later on with bergonization of the muscles of the crus.

Anatomicopathological examination of the extirpated cyst (Ringertz): the cystic wall is made up of connective tissue of

an appearance that conveys the definite impression of a synovial tissue. No nervous elements were found in the wall. It is in all probability a ganglion.

As the patient had been here for 3 weeks he began to complain of pain in the right upper arm, tenderness on the medial side over the vessels and nerves and certain paresthesias of the hand. The cord of vessels and nerves appeared to be somewhat thicker than on the left side and was somewhat tender on palpation. There were neither sensory nor motor disturbances. When he was discharged on Aug. 7th, 30, he had still pain in the upper arm and paresthesias on the volar aspect of the forearm but neither motor nor sensory disturbances. Operation was not considered indicated. When the patient was discharged the foot on the whole showed status quo. He could perhaps move the toes more than previously, but he could not dorsiflex the foot. The sensory disturbances remained unaltered.

2½ months after he had been discharged no positive change could be established when the patient appeared in the Out Patient Department. He had to walk about at home with Lange's inset and surgical boots in order to prevent the drop-foot position. We did not see the patient again until April 24th, 1931, i. e. about a year after the onset of the disease. Now he stated that his condition had improved uninterruptedly during the past 6 months, the improvement comprising both the power and the sensibility of the right crus. Never any pain in the leg.

*Present condition:* The patient is in good health and is doing well. No atrophy of the muscles of the right calf. On palpation of the peroneal nerve nothing abnormal can be felt. He is able actively to dorsiflex and circumduct his right foot to the same extent as the left, however not with exactly the same power. The sensibility has improved considerably and, on the area referred to above, the patient is able almost everywhere to recognize a touch by means of cotton-wool and is able to distinguish between the head and the point of a pin. As far as a small area between the malleoli is concerned the patient is uncertain. The patellar reflexes cannot be elicited with

certainly, but the Achilles reflexes as well as the reflexes of the sole of the foot are normal. The Patient's gait is unimpaired, and the foot does not cause the least trouble. Pain and paresthesias remain in the right arm, occurring now and then as before, but there are no dissociation symptoms.

As far as I can see the same alterations have been present in my two cases as those termed ganglia of the nerve sheath by the authors quoted above. They are very rare. According to Zaar 11 cases have been reported, but 5 of these are said to have been cases of the *nervus peroneus communis*. In my two cases the alterations were also localized to the peroneal nerve, they must, however, in the first case have been strictly confined to the part of the nerve corresponding to the *nervus peroneus profundus*, accompanying the latter high up towards the gluteal fold without invading the adjacent nerve trunks.

With regard to the etiology Zaar emphasizes that trauma takes a great part in the occurrence. In my first case there is a violent trauma which both engendered a paralysis direct and also had to be considered the cause of the cystic degeneration of the nerve sheath. The other symptoms which also were caused by this cyst formation were first and foremost the increasing pain in the back of the thigh, disappearing in connection with the operation, while the paralysis and the sensory disturbances remained unaltered. Neither trauma nor any other cause of the degeneration can be demonstrated in the second case.

In morbid anatomy these conditions are described under rather varying headings: »Chronic inflammation of the peri- and endoneurium«, »Vom Bindegewebe der Nervenscheide ausgehende wahrscheinlich traumatisch bedingte Erweichungscyste, ein Ganglion« etc. The prevailing view is probably that these cysts — as the ganglia of articular ligaments and tendon sheaths — should be regarded as the results of degenerative alterations of the nerve sheath.

The treatment should be an operation with excision of the cysts. According to Zaar ganglia belonging to the perineurium may easily be isolated from the nerve, which is also confirmed

by these two cases. When the cyst is situated more centrally it is recommended (Zaar) only to split the cyst in order to spare the nerve.

The prognosis in operative treatment is said to be favourable, which is clearly illustrated by my second case in which *restitutio ad integrum* took place. In the first case we only succeeded in freeing the patient from the troublesome pains, which as referred to above were the only true symptoms of his ganglia.

### SUMMARY

Sometimes strange alterations are seen in the nerve sheaths of the peripheral nerves which are termed ganglia in the nerve sheath (the perineurium) by most observers. These ganglia, which can become rather large, must be supposed chiefly to occur after traumata, and in morbid anatomy they are described as the result of degenerative alterations of the nerve sheath, »*Erweichungscysten*«.

It appears that the peroneal nerve is often attacked, namely in 5 of the 11 cases previously published, to which must be added the two cases reported here.

The alterations, clinically giving rise to various troubles corresponding to the extension of the nerve attacked, may lead to a complete destruction of the nerve.

The treatment should be an operation with exstirpation of the parts of the nerve sheath in which the morbid alterations have occurred.

The prognosis is favourable when treatments is commenced in due time.

### RÉSUMÉ.

Il se produit quelquefois dans le périnèvre des nerfs périphériques une altération étrange, désignée par la plupart des observateurs comme des ganglions du périnèvre. Ces ganglions qui peuvent devenir assez gros, paraissent se développer principalement par suite de quelque trauma. Au point de vue anatomopathologique on les désigne comme le résultat d'altérations

dégénératives du périnèvre, »Erweichungscysten«. Cette lésion paraît le plus souvent frapper le nervus peroneus, ainsi dans 5 cas sur 11 déjà mentionnés, et de plus dans les 2 cas ici présentés.

L'altération, qui se traduit par des symptômes gênants au niveau du nerf lésé, peut mener à la destruction complète de celui-ci.

Le traitement indiqué est une intervention chirurgicale, avec extirpation des parties malades. Le pronostic est favorable, si le traitement est entrepris en temps utile.

### ZUSAMMENFASSUNG

Bisweilen tritt in den Nervenscheiden (Perineurium) der peripherischen Nerven eine eigenartige Veränderung ein, die von den meisten Beobachtern als Ganglien in der Nervenhaut bezeichnet werden. Diese Ganglien, die ziemlich gross werden können, scheinen hauptsächlich nach Traumen aufzutreten und werden pathologisch-anatomisch als Resultat degenerativer Veränderungen in der Nervenscheide, als »Erweichungscysten« beschrieben.

Der Nervus peroneus scheint am häufigsten angegriffen zu werden, nämlich in fünf von den bisher publizierten elf Fällen; hierzu kommen nun die hier mitgeteilten zwei Fälle.

Die Veränderungen, die klinisch verschiedenartige Schwierigkeiten machen, entsprechend dem Gebiete des angegriffenen Nerven, können zu vollständiger Zerstörung des Nerven führen.

Als Behandlung ist Operation mit Exstirpation der krankhaft veränderten Partien der Nervenhaut anzuraten.

Die Prognose ist bei rechtzeitig vorgenommener Behandlung günstig.

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