ANALYSIS OF SOME CASES

TREATED BY THE OPERATIONS

OF

NERVE SECTION AND NERVE STRETCHING

A GRADUATION THESIS

PRESENTED TO THE

MEDICAL FACULTY OF BERNE UNIVERSITY

BY

CLARINDA BODDY, L. K. Q. C. P. I.

FROM

LONDON

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ACCEPTED TO BE PRINTED ON THE REPORT OF
PROFESSOR DR. KOCHER.

BERNE, July 1888.

Prof. Dr. Kronecker, Dean.

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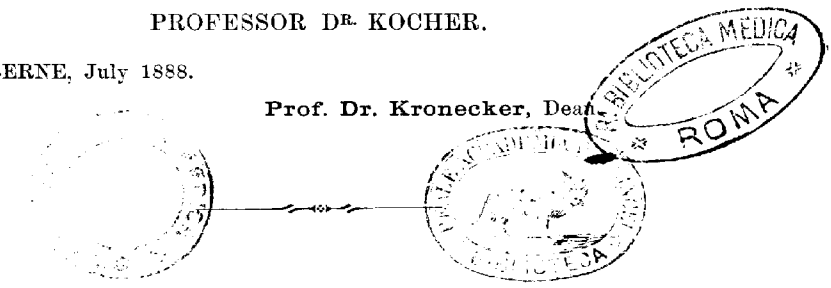

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I beg to offer my sincerest thanks to

D^{R} F. DUMONT

late surgeon to the out patient departement of the Inselspital Berne for seeing these pages through the press, and also for other valuable help given to me during my studies at Berne.

NERVE SECTION AND NERVE STRETCHING.

Among surgical operations those of nerve section and nerve stretching probably possess more than ordinary interest. The following ten cases illustrating some of the results of such operations were put into my hands by the kindness of Professor Kocher of Berne: It may be allowed to preface them by a brief review of former experience.

The physiological effects of nerve stretching were studied so long ago as 1858 by Harless and Huber and by Valentin in 1864 [1]) and by many others since.

Pathological experiments as to the effects of nerve stretching were made on animals by Brown-Sequard, Arloing, Tripier and others [2]).

But it was in 1860 through a sort of accident that the possible therapeutical value of nerve stretching first suggested itself to Nussbaum [2]). During the resection of an elbow joint the nerve was much stretched by the hook of an assistant. After the operation the tetanic spasms, from which the patient sufferred, disappeared, and Nussbaum attributed this unexpected result to the

[1]) Vicaire. Maladies chirurgicales des nerfs et opérations qui se pratiquent sur les nerfs. Encyclopédie internationale de Chirurgie. Paris 1884.

[2]) Dr. Paul Vogt. Die Nervendehnung als Operation in der chirurgischen Praxis. Leipzig 1877.

accidental stretching of the nerve during the operation. A somewhat similar incident is said to have happened to Hauser in 1861 [1]), who found that a contraction of the fourth and fifth fingers was cured after resection of the elbow during which the ulnar nerve was also accidentally stretched. Nussbaum was confirmed in his suspicions by the experience of Billroth [2]) who, in July 1869, laid bare the sciatic nerve of a patient who, since a fall on the nates, had been subject to epileptiform attacks. The nerve was very carefully examined, but no lesion found. The results of this apparently useless operation were however most favourable; the good effects developed themselves somewhat gradually, but in October 1869 the patient was dismissed cured.

This result determined Nussbaum [3]) to make that experiment in nerve stretching which inaugurated a new departure in surgery. The subject of this operation suffered from a contraction of the left arm and of the same side of the thorax in consequence of an injury which he had sustained two years previously. On the 15th February 1871, Nussbaum stretched the left ulnar nerve at the elbow and also at the brachial plexus, the operation was watched with breathless interest by the spectators; and its results awaited by Nussbaum with „doubtful thoughts". The cure was complete and so a new experience was won.

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[1]) Kerez. Inaugural-Dissertation. Basel 1878.

[2]) Vogt. Op. cit.

[3]) Archiv für klinische Chirurgie, von Langenbeck, 1872. Bd. XIII, §§ 379—395. 1.

Blosslegung und Dehnung der Rückenmarksnerven, eine erfolgreiche Operation. Deutsche Zeitschrift für Chirurgie 1872. I. §§ 450, 465.

In 1872 Gartner [1]) repeated Nussbaums experiment, on the brachial plexus of a patient, who had been paralysed in the right half of the body for thirteen years, and who for one year had suffered from very severe pains which could not be accounted for. The patient awoke from the anæsthetic free from pain, but death occurred in fifteen days from hæmorrhage from the jugular vein. In this year (1872) also Patruban [2]) cured a sciatica of three years standing by nerve stretching, all other means having failed. After this, the operation was undertaken by several eminent surgeons and came more and more into vogue. It was introduced into England by Callender in 1875; into France by Verneuil. At first, it was only used against neuralgias, but has since been very widely applied; for general and partial convulsions by Credé [3]), Braun, Verneuil [3]), etc.; for tetanus by Kocher and Vogt, for epilepsy, by Nussbaum [4]), for tabes dorsalis by Langenbuch, Erlenmeyer, Esmarch [5]); for anæsthetic leprosy by J. R. Wallace [6]) and Lawrie [7]); the optic nerve has been stretched by Wecker [8]), Pomard [9]) and Kümmell [10]). In spite of opposition the renown of this operation increased rapidly;

[1]) Vogt, op cit.

[2]) Vogt. Patruban. Blosslegung und Dehnung des Hüftnerven. Allgem. Wiener med. Zeitung. Referat in: Centralblatt für med. Wissenschaft, 1873, § 254.

[3]) Vogt. Vicaire, op cit.

[4]) Gussenbauer: Ueber Nervendehnung. Prager med. Wochenschrift 1882, Nr. 102.

[5]) Berliner klin. Wochenschrift 1879, Nr. 48.

[6]) Medical Herald, March 1881.

[7]) Indian medical Gazette, Sept. 1878.

[8]) Annales d'occulistique, 1881, T. 85, p. 134.

[9]) Pomard. Soc. de Chirurgie, 12 Avril 1882.

[10]) Deutsche medicin. Wochenschrift, 1. Januar 1882.

and indeed the number of surgeons who have employed nerve stretching is so great, and the literature about it so large, that the mention of any special names is almost invidious. As instances however of its very wide spread use it may be excusable to mention, that in 1883 Omboni Vicenzo had collected 500 cases; and in 1884 Lagrange published a memorial containing observations on 415 cases.

As examples of statistics we may quote [1]) those of Vogt, who gives twelve examples of the earliest operations, dating from 1869, which may be thus briefly summed up:

Disease		Cases
Neuralgia,		
(without known cause,	3	
after injury	4) =	7
Clonic spasm		1
Epilepsy		2
Traumatic tetanus		2
	Total	12

All these cases had in common one cardinal symptom: irritability in the sensory and motor region of the affected nerve; and one common result of the operation: abatement of this irritability. In seven cases objective changes were found in the affected nerve; in five cases no such changes were observed.

As specimens of the results of some later operations, we will give a table of the cases collected by Doctors

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[1]) Die Nervendehnung, experimentelle und klinische Studie. Dr. Paul Vogt 1877.

Fenger and Lee [1]) from the practice of surgeons in all parts of the world.

Disease	Cases	Cure	Partial cure [2])	Failure
I. Neuralgic anomalies				
a. Idiopathic or primary sciatica	10	7	2	1
b. Symptomatic sciatica	7	1 [3])	5	1
c. Neuralgia of 5th nerve	12	9	1	2
d. Intercostal neuralgia	1	—	1	—
e. Idiopathic neuralgia of other nerves	5	2	3	—
f. Neuralgias of peripheral nerves, caused by surgical operations on nerve trunks	11	8	2	1
II. Spastic anomalies				
a. Mimic spasm of 7th nerve	5	5	—	—
b. Spastic Torticollis	6	1 (2) [4])	1	2
c. Spastic contractions of nerves of the extremities	3	—	3	—
III. Epilepsy	3	1	1	1
IV. Paralysis	1	1	—	—
V. Tetanus	21	9	—	12
VI. Locomotor Ataxia	7	—	—	1
Pain	—	5	—	—
Incoordination	—	2	3	—
VII. Anæsthetic Leprosy	2	—	2	—
Total	94	53	23	21

[1]) Nerve stretching by Drs. Christian Fenger and E. W. Lee. Chicago, U. S. Reprinted from the Journal of nervous and mental diseases. Vol. VIII. No. 42. Ap. 1881.

[2]) Relieved only, or cure followed by relapse.

[3]) Cachexia and death followed in two cases.

[4]) Two cases cured by stretching, plus excision.

These statistics, although very few among the numbers accessible, are yet sufficient, and sufficiently varied in character, to afford grounds on which to form a judgement as to the value of the operation.

As the use of the operation spread so, also were discussed not only its success, but its failures and the limitations of its application. As for instance by Noch and Westphal [2]). As examples of the necessity of giving no hasty opinion as to its lasting results may be cited a famous case of Nussbaum [2]) (the disease being neuralgia which is its most favourable indication) which was said to be a perfect cure, but which Westphal [3]) afterwards found to have relapsed: also Walsham's [4]) observations on forty eight cases published as cured, 15 of which he traced and found that 5 had relapsed at the end respectively of 3, 14 and 18 months.

The history of nerve section begins at a somewhat earlier date, than that of nerve stretching. Ancient surgeons treated traumatic neuralgia of the head by deep incisions round the wound. But it was not until the middle of the last century that nerve section became a recognised surgical operation [5]). Maréchal first thought of it as a cure for tic douloureux. Section of the nerve however proved insufficient and André of Versailles towards the close of the 18th Century destroyed a portion of the nerve by the actual cautery. For a time nerve-section fell into discredit in consequence of its too frequent failures, which were due probably to its being

[1]) Ueber die Erfolge der Nervendehnung. Berlin 1882. Hirschwald.

[2]) Centralblatt für Nervenheilkunde. 15. Febr. 1882.

[3]) Bayrisches Intelligenzblatt, 1878, Nr. 53.

[4]) British Medical Journal. Dec. 1880.

[5]) Vicaire, op cit.

applied only to facial neuralgias, these being the most obstinate of all such affections. Resection of the nerve was first used by Bérard [1]) (1836) for trigeminal neuralgia. Neurotomy was revived about 1852 by Roux in France, Lorenzi and Borelli in Italy and Wagner in Prussia. Later its application was more fully worked out by Nélaton in France and by Weber of Bonn, but it was Létievant [2]) who studied it most thoroughly and most contributed to bring it into general use.

The operation is sometimes followed by immediate cure, sometimes its favourable results develop themselves more gradually. But relapse is by no means unexceptional, and that even after a considerable period of relief. Denis [3]) gives the following results of his observations of twenty one cases.

6 cases recurred in from 12—13 months
3 ,, ,, ,, 6—12 ,,
4 ,, ,, ,, 1— 6 ,,
4 ,, ,, before 1 month
4 no recurrence. But these cases were only observed for a period of 1 or 2 months.

The value of the operation however can hardly be fairly estimated by the mean result of cases, but depends rather on the fact that many cases, set down as incurable, owing to their having resisted all other treatment, have yielded to section of the nerve.

In 1882 Dr. Dumont of Berne [4]) published an account of seven cases of facial neuralgia operated on by Pro-

[1]) Kerez, op cit.

[2]) Létievant. Traité des sections nerveuses. Paris 1873.

[3]) Quoted by Nicaise.

[4]) Ueber den Erfolg der Nervendehnung und Nervenresection bei Trigeminusneuralgien von Dr. F. Dumont, Assistenzarzt der chirurgischen Poliklinik zu Bern. Deutsche Zeitschrift für Chirurgie, Bd. XIX, 1883.

fessor Kocher of Berne University; the results being as follows.

Summary of cases operated on by Professor Kocher and reported by Dr. Dumont. Trigeminal neuralgia.
Two cases of nervestretching one successful, one relapsed.
Case I, G. L., age 49 years.
Duration of neuralgia. Fourteen months.
Operation May 23th 1879.
Immediate cure and one year's freedom from pain.
Relapse in one year; since October 1881 confined to bed with pain. Last heard of in April 1882.
Case II. A. B., aged 20 years.
Duration a few months.
Operation, June 21, 1879.
Result. Cure.
Last heard of June 1882. Quite well, has had no relapse.
Three cases of Neurectomy. Two successful, one a failure.
Case III. F. W., aged 47.
Duration: 20 years occasional pain and very severe and constant pain for three years and a half. First operation, June 14th 1873. Three cm. of nerve removed.
Result: Eight months freedom from pain then
Relapse: March 1874.
Second operation, April 30th 1874. Actual cautery.
Result: Three years freedom from pain then two short relapses, one of 14 days in 1878, one of two or three weeks in 1880 followed by recovery.
Last heard of in 1883 (nine years after the operation). Quite well and satisfied with the results of the operation.
Case IV. A. E. G., aged 59.

Duration: two years neuralgia.

First operation May 1872. Subcutaneous section of nerve on one side.

Second operation June 12. First operation repeated on both sides.

Third operation, September 24th 1872. Three cm. of nerve removed on right side.

October 7th. Dismissed as cured.

Fourth operation end of October 1872. Last operation, repeated on left side.

Result. Eleven months freedom from pain.

Fifth operation, October 15th 1873. Nerve freed from adhesions and 1,5 cm. removed.

Result. A few months respite with relapse in following January 1874.

Sixth operation, February 1874. Last operation repeated on right side.

Result: One year's freedom from pain followed by complete relapse.

In April 1882, (eight years after the last operation): Pains continue as severe as ever, in the winter patient is confined to bed. In March 1883, pains still persist, but are not so severe.

Case V. L. L.

Duration of neuralgia: Twenty eight years occasional attacks. For three months pain severe and constant.

Operation: February, 13th 1878, 2 cm. of nerve removed.

Result: Cure in a few days. No relapse until December 1880, when he died.

Two cases of nerve section, combined with nerve stretching.

Case VI. S. S., aged 68.

Duration: Traumatic facial neuralgia of a few months date.

Operation, July 15th 1881, 2 cm. of nerve removed.

Result: Cure and no relapse for two years, i. e. until March 1883, when last heard of.

Case VII. C. D., age 60.

Duration sixteen years.

History up to July 1881. Nerve section performed four times; first time ten years ago, the last in 1880. Relapses occurred after the first three operations in two years, after the last in ten months.

Operation by Professor Kocher, July 19 1881, 2 cm. removed from the right infraorbital nerve.

Result: Cure. A slight and temporary relapse in February 1882. In October 1881, (three months after last operation) severe neuralgia of the right inframaxillary nerve set in and persisted until the summer of 1882, after which it became better, but had not entirely disappeared in February 1883, when patient was last heard of.

Of these two last cases Dr. Dumont says, the time since the operation is too short for a decided opinion.

Summary:

Operation.	Cases.	Cure.	Relapse.
Nervestretching	2	1	1 [1])
Nervesection	3	2	1 [2])
Nervestretching combined with nervesection	2	1	1 [3])
Total	7	4	3

[1]) After one year.

[2]) Slightly improved. Patient hysterical.

[3]) Failure.

The following ten clinical histories are examples of cases in which Professor Kocher applied the same operations to more varied forms of nerve disorder:

CASE I.

Herr S. Age 32. July 20th, to 25th 1887.

Diagnosis: Incipient traumatic tetanus in consequence of section of a volar branch of the median nerve.

Treatment: Complete section of the nerve.

Result: Cure.

History: July 20th 1881.

On July 17th patient broke a glass and cut himself in the palm of the left hand. Bleeding was copious and difficult to arrest. He fainted several times. The next day (18th) in the morning, he went to a doctor who ordered carbolic lotion, but did not touch the wound which looked healthy. During this visit, the patient had a short but severe spasm of the lower jaw. The doctor recommended him to come again, if he had any recurrence of the spasm. Patient was quite well until the 19th, when the trismus reappeared for a second or two; and again in the evening his neck became stiff, but rubbing relieved it. He slept well. 20th the stiffness of the neck reappeared with stricture of the jaw. Patient went to the doctor, who immediately sent him to the hospital.

The wound was examined and appeared healthy. An Esmarch's bandage was applied and the wound further opened by a cross incision. The slightest touch of the wounded tissues was excessively painful. No glass splinter was found in the wound. The injured tendons of the flexores digitorum sublimis et profundus could be seen

on the floor of the wound. The deep branch of the median nerve was also wounded and touching this showed that it was the starting point of the pain. This nerve was cut through both above and belong the injured part. After this, the extreme painfulness of the wound ceased, the tendons of the flexors were united by silk sutures; a carbolic bandage was applied and the arm placed in a splint.

21th, during the night, the patient could not sleep although he took 4,0 gr. of chloralhydrate. He says he once noticed a constriction of the throat, but no trismus or stiffness of the neck. 22th bandage changed, wound appeared healthy, no more pain. 24th bandage changed, wound suppurating slightly, patient has had no more tetanic seizures.

July 25th patient dismissed cured.

CASE II.

Schmidt. Age 48. October 30th 1883.

Tetanus occurring twelve days after a wound by an iron splint over the pisiform bone. The foreign body was removed and the wound desinfected, the treatment was successful and progress was favourable until 10 days after, when the patient took a walk in the cold.

1st November 1883. Bandage removed in the afternoon, secretion from the wound rather copious. Suture removed, although the wound had not closed. Drainage tube left in on account of persistent secretion. Temp. 12 a. m. 38,2 C.; p. m. 38,3 C.

Nov. 2nd: Drainage tube removed, little secretion. No fever.

5th: Wound already clean. Granulations more in the arm, than in the hand.

8th : All sutures removed, dressed with bismuth. Wound in arm closed, but that in hand still opened. Some parts looked necrotic and were dressed with iodine and bandage. Patient got up.

10th: Patient went out into the terrace and felt a chill. Complains of pain in the region of the left masseter muscle. Pains are severe and recur continually. Says he had them slightly the evening before and implies that he has had already similar pains.

11th: Wound doing well, a portion of the edge of the wound in the hand is of a greyish white colour, iodine applied. At night patient very restless, complained of great pain about the region of both masseters, especially the left; there is no difficulty in opening the mouth. The head is strongly retracted when in bed. Some pain in the chest.

12th: Condition the same as last evening, pains troublesome and now extend to the back.

Nov. 12th: Observations by Professor Kocher. Patient has a peculiar expression and his features are distorted. He complains of pain in the left masseter muscle and in the chest and abdomen. The abdomen is very much distended. The left masseter is stretched. Has the patient tetanus? The distribution of rigidity is characteristic. The neck is rigid, the left hand cannot be opened, but the movements of the arm and fingers are free. The muscles of the back are very rigid, when the patient sits up, which he can do without assistance, his position is distinctly that of opisthotonos. He can flex his legs and the calf muscles are free. The muscles are not continuously contracted, here and there they are free. Apparently there is no great increase of the reflexes. Yesterday afternoon, the patient had some difficulty in

swallowing, which increased towards evening. The wound itself is in good condition, the granulations are healthy.

Now how did this man come by tetanus? The wound was completely desinfected. For twelve days he had no sign of infection. When the wound was examined he had no pain in the region of the ulnar nerve. Tetanus caused by a punctured wound will frequently recur from the presence of a foreign body pressing on an injured nerve. On the 10th/11th patient went onto the terrace and received a chill, this determinded the outbreak of the already threatening tetanus. The fact of the chill makes the diagnosis somewhat less dubious.

The ulnar nerve is very sensitive at the pericondyle. The hand is somewhat rigid in the region of the ulnar nerve and in the ball of the thumb. Extension of the fourth and fifth fingers causes violent pain.

In the course of examination it appears that we have found a local cause for the tetanus. We have to deal with a diseased nerve. But if possible the nerve itself must not be touched as frightful paroxysms of the disease have often been brought on by handling the nerve. We may however make a section of the nerve above the diseased spot.

12th Nov.: The operation was at once undertaken. The instruments in carbolic solution. Sublimate used for irrigation. The part to be operated on was frozen by ether spray. A longitudinal incision of 5 cm length was made over the course of the ulnar nerve above the internal condyle. The nerve was found, streched and cut through. At the moment of section the patient had a rather severe spasm. The former wound in the hand was then laid open as far as the hand, it did not seem to be very painful.

The effect of the section of the nerve is plainly seen in its region; that is in the fourth and fifth fingers. Both wounds were closed with sticking plaister, dressed with sublimate lotion and bandaged.

During the hour after the operation the patient took three grammes of chloral, after which he slept until 3 p. m. He then had some milk, but swallowed with difficulty and had a slight spasm, which quickly disappeared. He then slept quietly until 5 p. m., when he made water, soon after this he had a severe attack, during which his head was strongly retracted and his back slightly arched, his arms were not affected, he trembled all over and rolled about on the bed. 6 p. m. patient sleeping quietly, but head still retracted. No trembling of the limbs, no fever, no albumen.

Nov. 13th: Patient has been quiet during the night. His head does not appear quite so much retracted as yesterday. Respiration is not essentially troubled. The abdomen is as hard as a board. Mouth opened easily, 3,0 gr. chloral administered in an enema. This dose was repeated twice during the day. Attacks only came on when the patient was touched or attempted to eat. He slept nearly the whole day. In the evening he had a sudden and severe attack without any apparent external cause. Respiration deep and snorting.

14th: Patient slept very quietly during the night, but became restless toward the morning. Injection of curare, which was repeated at 5 p.m. At 1 p.m. 3,5 gr. chloral in an enema, later two eggs also in an enema. In the evening the spasms were weaker, patient swallows better and sweats less.

15th: Patient very restless during the night. In the morning and, again in the afternoon, he had injection of 0,003 curare, and 3,0 gr. of chloral in an enema. Rigidity somewhat relaxed and difficulty in swallowing less. Since yesterday morning has had no attack. Wound in the arm easy, nerve above the section not painful. Nourishing enema. Temp. 38,2 C.

16th: Patient worse again to day. Curare has lost its effects. Temperature rose this morning without known cause; this fact is very unfavourable for the prognosis. Spasms very frequent and the patient complains of severe pain in the chest and abdomen. Head still retracted. Limbs free in the intervals of the attacks. He swallows fairly well and the massceters are not much stretched. Temp. 39,0 C. Nutritive enemata.

17th: Patient restless. Spasms and opisthotonos have increased. Temp. 38,8 C. Nutritive enemata, 10,0 gr. of salicylate of sodium in three separate clysters, curare discontinued. Two chlysters of chloral each 3,0 gr.

18th: Patient slept quietly until 2 a.m. On awakening he had a tetanic seizure. Temperature 39,4. Respiration snorting. During the course of the day he had 3 salicyl clysters each 5,0 gr. At 10 a.m. 3,0 gr. of paraldehyde by the mouth; twenty minutes after taking this, patient slept profoundly. 4 p.m. 3,3 gr. paraldehyde, 5 minutes after he again slept profoundly. 11 p.m. 2,0 gr. paraldehyde, did not sleep after it. Temp. 40,2 C. Pulse 100.

19th: Several attacks during the night. Rigidity of body great. Temp. 39,6. Clyster 5,0 gr. salicylate of sodium. During the day several severe spasms following close on each other. During the latter half of the day, patient had three clysters of 5,0 gr. salicylate. No paraldehyde,

being unable to swallow. He was given a little wine and food but spat it out. The bandage on the arm, being offensive, was changed. The wound looked healthy, secretion copious, it was dressed with a simple bandage. In the attacks which were numerous patient screamed aloud. Temp. 39,8.

20th November: Temp. a. m. 41. Attacks very numerous, patient screaming loudly. Respiration frequent and superficial. Patient will not take food, one clyster 5,0 gr. salicylate, no medicine after this. At midday the attacks became continually more frequent and severe. Patient dying in one of them about 12 o'clock. One hour after his death his temperature had risen to 44° C. (= 111,2 F.).

Report of the post mortem examination:

21th November. The whole of the back with exception of the shoulders blades, is covered by hypostases. Slight scoliosis of the dorsal spine. Vertebræ normal. *Vertebral canal opened.* Dura mater much stretched in the region of the corda equina, much serum. Surface of cord only slightly injected. At the bulbar swelling the veins are not very full, at this place numerous small white partially calcified plates were found in the arachnoid. Posterior nerve roots: nil. Pia mater on the anterior surface of the cord also somewhat injected. Interior nerve roots, no change, consistence generally good. The whole cervical portion somewhat broad and flat, grey substance slightly injected; white substance projects somewhat forward. No asymmetry. Dorsal portion. Consistence somewhat hard. White substance does not project forwards. Same conditions in the remaining parts of the cord. *Skull.* Symmetrical. Dura mater somewhat distended. In the sinus a little coagulated blood. Thick-

ness of the dura normal; its inner surface damp. Pia mater on both sides only slightly injected; cerebrospinal fluid not increased. Base of brain no change; hypophisis very small. In the lateral ventrical some red effusion. The ependyma and plexus slightly injected, ependyma somewhat thickened polished smooth and hard. Fourth ventrical nothing to remark. White substance somewhat injected; grey substance not much injected. In the cerebellum, pons, medulla oblongata: nothing abnormal.

Body very strong, great muscular development. Panniculus moderately developed. Numerous echymoses in the perimuscular connective tissue, chiefly on the throat on the right side. Diaphragm: right side at the fifth rib, left side at the first rib. Intestines moderately distended. No effusion in the abdominal peritoneum. Post mortem effusion in the connective tissue of the lumbar region. Liver and Kidneys: nothing abnormal. Lungs well retracted, little serum in the pleuræ. In the right arm, there is is a long wound extending from the wrist to about the middle of the forearm on its ulnar side. There is also a wound near the olecranon, in which the ulnar nerve lies cut through. The axillary glands on the right side are much swollen reddened and of moderately hard consistence.

Two cases of sciatica.

CASE III.

Gottfried Ingold. Age 34. Jan. 26th to Febr. 20th 1882.

Operation January 29th. Patient placed under an anæsthetic. Antiseptic precautions (carbolic acid chosen). A deep incision was made through the muscular tissues over the point of issue of the great sacrosciatic nerve

from the great sacrosciatic foramen. Bleeding which was rather free was arrested by ligatures. The sciatic nerve was very strongly stretched (both upwards and downwards), patient's body being several times lifted up during the stretching. Sutures made, a tampon and a provisional bandage applied.

30th: Both the superficial and deep sutures were so well united that drainage was unnecessary.

Feb. 3th: No disturbance of mobility or sensibility, has appeared in the region of the sciatic nerve since the operation.

5th: The wound appears healty. Dressed with iodoform and chloride of zinc.

8th: In the evening patient had a rise of temperature (38,6) unaccompanied by rigors. On inspiration he feels a stitch in the region of the spleen, on deep inspiration no stitch is felt. A distinctly circumscribed rub may be noticed at the same spot. Mustard plaster and morphia. Bandage not changed.

9th: Stitch persists. Rub may now be noticed not at the original site, but a little above and behind it. Morphia continued.

12th: Patient seems quite well, it is difficult to say, what has relieved him.

15th: Wound healed by first intention.

16th: On raising himself patient has same pains as before, but no more paroxysms.

20th: Patient complains of pains in the popliteal space, which he did not have formerly or very slightly, also of pains in the backs of the thighs on standing. No paroxysms. He can attempt the erect position, without fearing his former pains. Dismissed Febr. 20th: 1882.

Written to October 1884. Says he has had no pain since May 1883 (mentions however some remedy he takes.)

CASE IV.

G. H. Age 40.

The patient interviewed, no notes kept. She suffered for many years from pain in the leg, the onset was gradual, the pain at first was slight and intermittent, but it increased in severity and duration, until finally it never ceased either winter or summer. She described the pain as being extremely severe, so that she was quite doubled up with it. Massage and electricity were used but without avail. It took two persons to help her downstairs she was so disabled. She said she had suffered for more than four years before the operation. The sciatic nerve was stretched in September 1880. Pains persisted for eight months, during which massage and electricity were again used. The pains gradually disappeared, and in 1886 patient said, she had no return whatever of them and was perfectly cured. She walked with freedom, was quite upright and had every appearance of good health and strength.

CASE V.

Case of intercostal neuralgia.

Madame J. C. Age 43.

Notes of this case imperfect. The following is a short summary.

Patient is a healthy woman. About the middle of February 1885, she first felt pain in the 5th intercostal space which gradually became worse and extended down the left arm and by the end of June (14 days before coming to the hospital) over the whole of the left side

of the thorax. When she came to the hospital, July 10th 1885, she wore her left arm in a sling, as moving it brought on pain. Her most comfortable position was to lean on the right arm. The pain began every day between 1—4 a. m., was worst in the early morning, ceased about 6 p. m., the evening being free. The attacks were preceeded by constriction of the throat, and followed by a sensation as though the skin of the chest were torn from the underlying tissues; sometimes there was a feeling as though a worm were moving in the ribs, sleep was restless and she had unpleasant dreams, on waking she did not know where she was.

Operation of nerve stretching. July 11th 1885.

Result. Cure.

Written to in November 1886. Continues well, only very slight pain in damp weather.

Three cases of traumatic neuritis treated by nerve stretching.

CASE VI.

Magdalen Herman. Age 35. Febr. 25th to March 3rd 1885.

February 27th 1885: Patient is a housemaid, she comes of a healthy family and is herself healthy. She suffers occasionally from joint rheumatism, especially since residing in Berne. One day last summer she walked for four hours in new boots which were rather tight, especially the left one. The left foot swelled and she felt a burning aching pain in it after the walk and ever since when walking. When lying down there is no pain and the foot is less swollen, but on walking about the swelling returns and the foot often becomes intensely red. When the patient is resting nothing particular is

to be observed. She has taken medicine internally, but without effect. A month ago, she could get about without much hindrance. Since then the pains have increased, spreading over the whole leg, and are accompanied by a sensation of heat in the head. Present condition:

Febr. 27th: Patient is strong; muscles and fat well developed. Pulse 96, regular und fairly full in volume. Respiration 16—20. costal. Tongue somewhat coated. Palate normal. Pupils react normally. A few inguinal glands slightly swollen. Temperature normal. Abdomen and thoracic organs normal. A tumour about the size of a hazet nut or a walnut observed on the right side of the back. Slight kyphosis of the lower dorsal and lumbar vertebræ. Both lower limbs are of the same length, the thighs are of the same thickness, the left calf measures 2,5 cm., less than the right. Patient complains of a burning sensation beginning between the internal malleolus of the left foot and the tendo Achillis and extending to the sole of the foot. The skin at this place is discoloured by the application of a blister. Patient stands and walks well, but is careful how she puts her left heel to the ground. Both active and passive movements are retained and are painless. The whole region, where the patient feels objective pain, is sensitive to pressure. There is no deficiency of sensibility. The arch of the left foot is not equal to that of the right. The sensitiveness to pressure noticed behind the internal malleolus, extends up to the lower third of the leg in the course of the posterior tibial nerve into the sole. With the above exception superficial contact causes no pain.

Provisional Diagnosis. Neuritis of the posterior tibial nerve with probable atrophy of the same.

Operation. March 7th: left posterior tibial nerve stretched. Nerve much thickened being almost as large as the anterior crural. The district supplied by it is sensitive to the slightest contact, which also causes twitching of the muscles. Immediately after the operation, there was diminished sensibility in the sole, but power of motion was retained. In the evening signs of disturbed sensibility showed themselves in the great toe.

March 16th: Bandage removed. Wound healed. Collodion applied.

18th: Patient has no pain, but there is much mental excitement. She left by her own wish.

Written to in November 1886: She acknowledges herself to be much better, but is so evidently unwilling to allow it, that she may be considered cured.

CASE VII.

Herr E. T. Age 37. From July 10th to August 5th 1885.

History. Two years ago patient had a fall, the left elbow and palm of left hand coming in contact with the ground, under his body; he immediately felt great pain in the forearm and hand which also became numb. Sensation returned to the hand in about half an hour, but the little finger remains numb to this day. The next day the elbow swelled up and he consulted a doctor who applied ice for two or three days and then put the elbow in a plaster-of-Paris bandage, which was kept on for a month. After its removal the arm was stiff. A quack doctor attempted to extend it, during the manœuvre the patient heard a crack in the elbow joint: movement after this, was somewhat freer. Six months later he

noticed a swelling in the region of the ulnar nerve just above the anterior ligament of the wrist. Tincture of iodine was applied, and the tumour disappeared in two or three days.

Present condition. July 22nd 1885: Patient now complains of: burning pain in the little finger and hypothenar and on the ulnar side of the fourth finger; a sensation of fatigue in the radiocarpal joint and in the elbow; but generally no pain. He cannot flex the left arm fully, cannot lay his left hand flat on his chest, nor button his collar. The movements cause him no pain, but there seems some obstacle to them in the elbow joint. Extension of the elbow is not complete. All movements of the fingers, hand and shoulder are normal. His arm is as strong as formerly. Contact on the fifth and ulnar side of fourth finger causes formication. There is no atrophy of the arm. Behind the condyle the ulnar nerve can be felt decidedly thickened, pressure here causes pain. No greater radiation of sensation than in the right arm. On the front of the forearm near the pisiform bone the nerve is not sensitive to pressure.

Indication: Stretching of the nerve.

Operation (July 22nd). Chloroform administered, but not to complete anæsthesia, as patient had a retarded pulse, probably from fatty heart. A longitudinal incision was made between the olecranon and the internal condyle. The ulnar nerve was easy to find, it was somewhat thickened and was bound down by a transverse band of connective tissue. It was freed from this adhesion and stretched. There was trifling bleeding. The arm was put into a wire splint and the elbow fixed at right angles.

23th: Patient is not feverish and has no pain, but feels quite comfortable. The formication caused by contact with the fingers is almost gone.

25th: Patient went home with his arm in the splint.

30th: Patient called. No fever. Contact causes less formication. He says, he feels twitchings in the elbow at night.

August 5th: Patient seen. Wound completely healed by first intention. No fever. Patient feels much better than before the operation, he has however still some burning pain, but only on the ulnar side of the fifth finger. Sensibility is intact. All movements of the hand and fingers are well executed.

October 1886: Written to, but no answer.

CASE VIII.

Herr P. Age 34.

History: 19th April 1881: Seven years ago the patient first experienced a sensation of intense heat in the right arm from the fingers to the elbow. The parts affected were the thumb, index and middle fingers, and the flexor side of the forearm; the sensation continues to the present day. Two or three months later stiffness of the arm and pain on the palmar side of wrist came on one morning, but were relieved by rubbing and disappeared towards evening. About eight months ago he noticed a swelling of the fingers and portion of the arm affected, in these parts also a sensations of heat and cold alternated. Movements of the wrist and elbow were painful. For the last two months the patient has had a sensation of heat in the left arm also, chiefly on the flexor surface of the wrist, to a lesser degree above the elbow, it generally comes on after movements in bed. In other

respects patient is healthy. He does not complain of pain in the back. No murmurs, or other cardiac symptoms.

11th April: The right median nerve was stretched. The wound healed by first intention. Since the operation there has been a sensation of heat above the right elbow extending to the right half of the head, to the chest and to the abdomen as far down as the navel.

20th April: *Present condition:* Patient is a very strong man. Mucous membranes somewhat pale. Compared with the left, the right arm appears somewhat atrophied. In consequence of a fracture of the olecranon the right elbow is flexed and attempts at its full extention are painful. Movements of the shoulder and wrist are free, but of the latter unpleasant. The thumb is extended, the fingers are flexed and cannot be fully extended, attempts to do so cause pain which reaches as far as the palm, the fingers are moved cautiously. Flexion is painless. The three first fingers, in which burning and formication are constant, present to observation no difference from the two last fingers in which these abnormal sensations are only exceptionally present. A cicatrice of about 4 cm. in length, is seen on the ulnar side of the flexor carpi ulnaris, pressure on which causes great pain. Pressure on the palm also causes radiation of pain into the fingers. Pressure over the median nerve also causes pain on the surface extending to about the middle of the forearm. Sensibility to a prick is normal. Patient says, he believes the cause of this affection to be that one day when chopping wood he extended his right arm violently; and afterwards had a sensation as though he had broken something in the region of the trapezium, on the palmar surface. The burning sensation in the hand began eight days after this accident.

Diagnosis: Traumatic neuritis of the right median nerve, increased by stretching of the same.

Indication for treatment: Galvanic battery and cold compresses.

21st April: Patient screams with the pain, which he feels over his whole arm. Since the use of the battery he is very unruly.

22nd: Patient better; pain decidedly less.

23rd: Yesterday evening patient complained loudly of pains which, he said, extended from his arm over his whole body. Persuasions and morphia injections were equally useless. As he much disturbed the other patients, he was sent to Waldau [1]).

May 14th: Patient returned. He is quieter after the isolation and baths. Search was made for a foreign body in the wrist, but nothing was found.

16th: Patient to be treated daily by the galvanic battery and twice daily by cold douches. Should these means fail, section of the nerve must be taken into consideration.

20th: Battery discontinued on account of the severe pain which it caused. Patient wishes to be operated on.

May 23rd: The right median nerve was stretched at the elbow, the immediate result being insensibility and paralysis of the two first fingers.

24th: Patient insists that he has severer pain than before the operation. *Ordered:* Potassii bromidi 3,0 gr. pro die; in three doses.

26th: No amelioration of the pain. *Ordered:* Chloral 2,0 gr.; morphia 0,01 gr., to be taken in the evening in addition to the bromide.

[1]) Asylum for mental diseases at Berne.

June 7th: *Third operation.* Section of the median nerve in the lower third of the forearm. The nerve adhered to the surrounding parts; the peripheral part was wasted. The wound was washed with chlorate of zinc lotion 5 $^{0}/_{00}$.

7th evening: Patient insists that he has as severe pain as before the operation. Only the fifth, fourth and ulnar side of the third fingers respond to a prick.

11th: Wound healed by first intention. Sensibility is present in all fingers. Patient complains of the other hand.

16th: Left by his own wish.

(NB. In this case, the notes do not make it clear whether there was any contraction of the fingers before the first operation.)

November 1886: Patient was written to, but no answer was obtained.

Two cases of traumatic functional disturbance in the region of certain nerves.

CASE IX.

Adolf Peyer. Age 25. Sept. 7th 1885—June 6th 1886.

History: September 9th 1885. Patient was working at a lever machine, when the upper part of his right arm was caught between two iron plates, each being 3 cm. in thickness, one having a flat and the other a convex surface. The machine was of two horse power and the plates were so arranged that during the space of one minute, they approached from a distance of 30 cm. to that of 2 cm. from each other. They were about 17 cm. distance apart when the patient's arm was caught between them and it remained for about two minutes in

that situation, the accident having arrested the action of the machine. A passing workman released the patient's arm. On one of the plates there was a peg, which made an indentation in the arm above the olecranon. There were extravasations on the outer and inner surfaces of the arm corresponding to the points of greatest pressure, that on the outer side being 2 cm., that on the inner side 3 cm. in length. Immediately after the accident patient could nether flex nor extend his arm without pain. The arm swelled the same evening and by the next morning there was no strength left in it, and all power of flexion or extension was lost. There was also a sensation of formication in the fingers (2, 3, 4) supplied by the median nerve. The arm was kept at rest for three weeks, after which the fingers could be extended, but not flexed. The arm could also be flexed and extended without much exertion or pain. The hand and fore arm were still swollen, but movements in the hand were free. When the bandage was removed, patient observed a cicatricial swelling (still to be seen) about the size of a hen's egg, uneven on the surface, immoveable and painful to pressure. The median fingers were also numb and continued so for six weeks, but yielded to massage which was applied regularly twice a day for that period, the tumour also diminished in size and became much more moveable. The patient also recovered strength in his arm and had no more pain. The swelling in the forearm and hand has disappeared since the massage. Patient is a healthy man coming of a healthy family; he has never yet had an illness.

December 19th 1885. *Present condition:* A hard tumour of somewhat irregular form can be felt over the biceps tendon extending from it, both right and left, but

especially to the inner side. The tumour adheres to the tendon and can be moved with it, but not against it. The impression given to the hand is that of a tumour surrounding the tendon on all sides. A second tumour; of very hard consistence, about the seize of a pigeon's egg, irregular in shape, having a tongue on the inner side, painful to pressure, and moveable from side to side, but not from above downwards; is found under the biceps tendon, at about the same level as the first tumour with which it is in close connection, so that one cannot be moved without the other. The brachial artery can be felt under the tumour. Pressure on it causes pain in the region of the median nerve, although the nerve itself cannot be felt. On the skin over the biceps tendon, is a mark like an iodine stain, about the size of a five francs piece. On both the outer and inner surfaces of the upper arm are signs of contusion and brown marks corresponding to the injuries of the skin. The hand and forearm are of normal size, the muscles are strong, there is no oedema. No sensory disturbance is discoverable in the hand.

Function: Elbow: Flexion only a little over the right angle; extension, pronation and supination normal. Passive movements are made more easily than active movements, but the most simple passive movements of the right arm are not equal to the active movements of the left arm.

26th December: *Operation:* An Esmarch's bandage applied. The incision through the skin and subcutaneous tissues, parallel to the median vein and on its inner side; through the deep parts, on the inner side of the biceps tendon. As the tumour adhered to both the biceps tendon and the lacertus fibrosus, it was neces-

sary to remove a portion of both of these structures, so that only a very thin lamella of the latter remained. The brachial artery and vein and the median nerve had to be separated from the tumour, this was easy enough in the case of the nerve, but more difficult with the artery and most so with the vein which gave off a branch into the substance of the tumour. The tumour was next separated from the brachialis internus (anticus) muscle in the substance of which it lay. It did not adhere to the periosteum, which was uninjured. The tumour was placed in alcohol. In the afternoon the patient complained of colic, from which he had not formerly suffered.

27th: Patient has great pain at the site of the operation and can move neither hand, nor fingers. Sensibility to pain is preserved; sensibility to touch somewhat lowered. Had morphia 0,02.

31st: Patient can move neither hand nor fingers. He has paraesthesia in the thumb and index fingers, but not in the other fingers. Sensibility not essentially disturbed, in the volar side of the thumb only, is sensibility to pain somewhat lessened. To day the colic is gone, some constipation.

January 4th 1886: *Condition:* Mobility of the hand absolutely nil. *Sensibility;* to pain and touch preserved in the four fingers, but fails in the thumb; to temperature disturbed in the thumb only; to pressure normal. Muscular sense normal in the fingers, disturbed in the thumb.

6th: Patient can adduct the thumb, but no movement of the other fingers or of the hand is possible.

7th: Pressure on any part of the median nerve causes pain. Faradaism to be tried.

9th : All the muscles react to faradism. Spontaneous movements of the thumb good. The fingers can be extended and flexed to some extent; sensibility normal.

12th : Movements of fingers normal.

21th : Patient is better.

23th : The muscles of the forearm respond to excitation of the median, ulnar and radial nerves.

Feb. 4th : Patient can now move all the muscles of the right forearm, although these movements are still somewhat limited.

Here there must be some lapse in the notes, it appears, that patient left the hospital and returned later but this they do not make clear.

May. The right forearm is somewhat atrophied in its upper part. It is colder than the left. The back of the hand is somewhat swollen. Sensibility is normal every where. It appears, that there is a recurrence of the formation on the brachialis internus muscle, there is a hard moveable resisting tumour of about the size of a hen's egg, which prevents complete flexion of the forearm. It moves both with flexion and extension and is somewhat painful to pressure. The cicatrix is very rigid. Patient treated with massage and electricity. The transverse growth already described has increased since the patient's residence in the hospital.

May 10th : Patient has on the right elbow the scar of the first operation, this part of the arm is thinner than the corresponding portion of the left arm. This is evidently the consequence of the excision of a portion of the muscles. Under the biceps tendon on the inner side, on the outer side in the situation of the internal brachial, there is a hard lump about as thick as a finger and 4 cm. in length, which reaches to the elbow, pressure

medianwards over this tumour excites a sensation of burning. Patient can move the elbow in all directions, but extension and flexion are still limited, especially the latter. The muscles of the forearm are strong. Movements of the wrist normal, except flexion which is somewhat weak, also adduction between the middle and index fingers is somewhat less than normal. The skin on the fingers is more shining than on the left hand. Sensibility on the ulnar third of the dorsum of the hand is decidedly lessened, also on the corresponding sides of the thumb and index finger. In general, sensibility is greater on the dorsum of the nail phalanges than on the others. Patient says, that when he has to flex his elbow strongly at his work, it causes a burning pain in the thumb, and that his hammer and file often fall from his hand in consequence of the disturbed sensibility.

Conclusions drawn from the examination: Some limitation of the movements of the elbow in consequence of the extirpation of part of the brachialis internus (anticus) and recurrence of myositis in the remaining portion of that muscle. Paralysis of the cutaneous branches of the radial nerve with corresponding diminution of the capacity of the hand. The slight defect in the moveability of the elbow will probably remain; how far the sensory disturbance in the region of the superficial radial branches will be changed, cannot be said until after the next operation.

May 26th: *Operation:* Incision at the outer side of the elbow, excision of the cicatrix on the skin. The operator came upon a compact callous cicatrical tumour, this was dissected away and the median vein was tied. A convulsive movement of the hand was observed. It

was found, that the radial nerve adhered firmly to the cicatricial tissue for about 3—4 cm. in length; it was dissected out with some difficulty, a small piece of the supinator longus having to be removed. The nerve was then stetched. In the lower part of the brachialis internus muscle and in the remaining portion of its tendon lay a hard compact mass about the size of a walnut, for the complete removal of this, another small piece of the muscle had to be removed. The adhesions between the cicatricial mass, the biceps muscles and the other tissues were difficult to separate.

28th: Bandage and suture removed. Wound completely closed, no reaction, dressed with bismuth and collodion. Healing by first intention.

As early as the afternoon of the day of the operation the patient felt some amelioration in the morbid condition of the thumb and index finger. Is is only when pressure is made on the radial nerve and at the elbow, that there is any burning in these parts. Sensibility is quite normal. The patient's other sensations are also normal, as formerly.

June 6th: Patient dismissed. Result: immediate restitution of sensibility in the region of the radial nerve.

Written to in Nov. 1866, but could not be found, having left his former abode.

CASE X.

Gottfried Andriot. Age 21. 17th June 1880.

June 22th 1880. *History:* Patient had bandy legs even from early childhood, but, in spite of this, he learned to walk as early as most children, and until a year ago, he could bring his knees into contact and was not incommoded, by his deformity. In the winter of 78—79,

he felt pain in both knees, but chiefly in the left, with every change of weather. About a month later than the onset of the pain, he noticed, that his knees were farther apart than formerly. The pains disappeared during rest, but were constant when standing, as obliged to be, when at work. The deformity of the lower end of both arms has also attained its present extent since December 1879, but without pain. Treatment has hitherto been without effect. Patient healthy; denies any specific infection. Father killed by an accident, mother healthy. One brother died of phthisis, seven other brothers and sisters all healthy and none of them bandy legged.

October 11th 1880: *Condition:* For his age patient is small and ill developed. When he stands with his feet in contact the knees are separated by one hand's breath and a half. He cannot walk without crutches and even with them walks carefully. The antero-posterior diameter of the thorax is increased; the lateral flattened. All the costal cartilages bulge forward, but especially so the second. Upper extremities: patient cannot extend his elbow; flexion and rotation normal. Epicondylus humeri and olecranon are very thick in proportion to their length. The lower end of the radius and ulna are thickened and very sensitive to pressure. In the fingers nothing to note. Lower extremities: The upper part of the thigh is curved with the convexity outward. All the bones entering into the knee joint are thickened, also the lower ends of the bones of the leg, most strikingly so the tibia. Angle of knee-joint: right knee 25° — left knee 35°. Both feet somewhat in position of varus. The shaft of the tibia is somewhat

convex outwards, but the chief curve between the epiphysis and diaphysis is not very apparent. The external condyle of the femur projects lower down than the internal. The head of the fibula is nearer the mid line of the joint than normal. Flexion of the knee joint is normal, but extension not complete. Pressure is not very painful, except at the lower epiphysis of the tibia, where it is very sensitive; at a particular spot the bones can be pressed in. The teeth are of typical rachitic form.

Diagnosis: A late attack of rachitis.

Indication: Osteotomy between the epiphysis and diaphysis of the tibia.

August 1st 1880: The patient's legs were bound together and as soon as the bandage became loose, they were rebound.

Sept. 3th: A slight, but decided improvement observed.

24th: The right leg since the bandaging is decidely straighter than the left.

October 1st: The right leg is straighter than the left, from the hip downward to a marked degree.

December 9th: *Operation.* Patient under chloroform. A longitudinal incision, of about 3 cm. was made in the upper third of the tibia at the place of projection. The knife came onto a much thickened periosteum which formed a layer of about one third of cm. in thickness. The underlying bone was rough and very vascular. The bone was chiseled through, the wound being held open by a large Volkmann's hook, the small remaining bridge of bone was broken and the leg placed in a straight line with the thigh. The wound was dressed antiseptically and the whole leg encased in a plaister-of-Paris bandage. The same evening the patient complained of

great pain in the leg. Temperature 37,6 C. Had 0,02 of morphia.

10th December: Patient complains of great pain in the heels and toes. Fever. Had morphia 0,02.

11th: Bandage loosened at the heel. Patient much relieved. Evening, patient better, complains only of the toes and anterior surface of the leg.

12th: Patient well. Temperature normal.

17th: Bandage removed, as patient complains of pain and can hardly move his toes. Nothing to note as to condition of wound. The leg appearing somewhat curved backwards just below the place of fracture, it was put into a splint and carefully padded. The extensors are evidently much injured. Patient cannot flex the toes.

13th: Patient feels better in the splint, but extension is almost nil.

27th: Patient doing well, does not complain of pain, but extension still nil. Electric current applied. In spite of the careful padding at the place of fracture, the tibia has decidedly moved backwards.

January 3th 1881: There is a bedsore at the head of the fibula over the site of the peroneal nerve. Paralysis of the extensors is very manifest, very little contraction observed in spite of the battery. The backward curve, of the leg is somewhat corrected. The false movement (?) at the seat of fracture is still very evident.

10th: Slight extension of leg in reaction to the battery.

17th: Reaction more marked, but extension not normal. Battery applied twice daily. Bedsore and operation wound healed. There is apparent fracture of the upper part of the fibula.

22nd: Extension still impracticable. Pressure on the peroneal nerve just under the head of the fibula is extremely painful, but not so above or below this spot. During the day, battery once and massage once. Stretching of the peroneal nerve taken into consideration.

February 2nd 1881: *Condition:* Patient can lift up his extended leg without assistance, he can also flex and extend the knee to an angle of about 180°, 150°. Complete flexion is easy, but patient complains of pain from it. He cannot rotate or supinate the leg, foot, or dorsal flex the toes, plantar flexion on the other hand is easy. The peroneal nerve between the dorsal surface of the condylus externus and the head of the fibula is painful to pressure; a few centimetres lower down it is still sensitive, but not to such a high degree. The fibula feels thickened just under the head and is somewhat curved backwards; hard pressure over it is painful. The operation wound is healed, but is not quite firm and is tender to pressure. It is assumed that during the operation the fibula was broken below the capitulum; and the callus, by pressure on the peroneal nerve, has caused neuritis and consequent paralysis in the region of that nerve. Nerve stretching decided on.

28th February: *Operation:* Patient narcotised. A longitudinal incision of about 5 cm. was made over the head of the left fibula. The nerve when found presented in its upper part the usual shining, tendon like appearance, but the lower part was very much thickened and reddened, resembling a muscle fibre, and adhered to the sheath and surrounding tissues. The nerve was freed from its adhesions and then vigorously stretched, both above and below. A counter incision was then

made in the outer wall of the wound behind to allow of free drainage and in this a drainage-tube was inserted and the wound was united and dressed with chlorzink.

Evening: Patient not recovered from the effects of the chloroform. Feels inclined to vomit, but cannot. Complains of colic. He can flex the toes of the left foot.

March 1st: Patient can flex the toes and the whole foot without pain. In general the power of movement for the whole limb is the same as before the operation of osteotomy. Electric reaction still absent as before the nerve was stretched. The electrodes took effect only on the calfmuscles, those in the region of the peroneal nerve being unaffected. The electrical examination was made by Professor Lichtheim.

This case may be taken as an instance of a rapid result of nerve stretching.

Patient written to in November 1886, answer received from his mother, the son being from home. „He has had no relapse and can walk without crutches or support. He has no pain in the leg which was operated on. When he has any pain, it is in the leg which was not operated on. I am very thankful to Professor Kocher."

We must now briefly sum up the cases and their results as far as possible. To begin with, there are two cases of traumatic tetanus both treated by nerve section, in one case accompanied by nerve stretching.

CASE I. Herr S.

Diagnosis: Traumatic tetanus.
Duration (before operation): Three days.

Condition: Spasms and stricture of lower jaw setting in the day after cutting hand.

Operation: July 20th 1881. Section in two places of the median nerve.

Result: Immediate cure.

CASE II. Schmidt.

Diagnosis: Traumatic tetanus.

Duration before operation: Two days.

Condition: Pain, retraction of head, distorted features, rigidity of parts of body. Opisthotonos, convulsions.

Operation: Nov. 12th 1883. Stretching and section of ulnar nerve. At moment of section a severe spasm. Effects noticed in region supplied by nerve.

Result: No amelioration. Condition progressed steadily from bad to worse, very high temperature, rectal feeding necessary, patient apparently only kept quiet by the influence of drugs. Nov. 20th death during a convulsion.

Three cases of neuralgia.

CASE III. Ingold.

Diagnosis: Sciatica.

Duration and condition: No notes.

Operation: Jan. 26th 1882. Energetic stretching of the sciatic nerve.

Result: No more paroxysms, but pain persisted for a time. No disturbance of sensibility, or mobility since the operation. (No note as to whether there was any such disturbance before operation.) Written to October 1886. Has had no pain since May 1883. Three years.

CASE IV. J. H.

Diagnosis: Sciatica.

Duration: Four years.

Condition: Extreme pain, lameness, patient unable to stand upright.

Operation: Sept. 1880. Sciatic nerve stretched.

Result: Gradual, but complete cure in eight months. In December 1886 no relapse. (Five years.)

CASE V. J. C.

Diagnosis: Intercostal neuralgia.

Duration: Five months.

Operation: July 10th 1885. Nerve stretching.

Result: Cure.

In December 1886 no relapse. Seventeen months.

Three cases of traumatic neuritis.

CASE VI. Herman.

Diagnosis: Neuritis after walking in tight boots.

Duration: One year.

Condition: Burning pain in left leg, some atrophy of the calf.

Operation: March 7th 1885. Stretching of the posterior tibial nerve.

Condition of nerve: Greatly hypertrophied.

Immediate effect of operation. Sensibility diminished.

Result: Cure in 11 days.

Written to Nov. 1886. No relapse. Eighteen months.

CASE VII. E. T.

Diagnosis: Traumatic neuritis.

Duration: Two years.

Condition: Impairment of motion with pain and formication in the left hand.

Operation: July 22nd 1885. Stretching of ulnar nerve, which was also freed from adhesions.

Condition of nerve: Hypertrophied.

Result: Cure. 14 days.

No news obtainable.

CASE VIII. P. S.

Diagnosis: Traumatic neuritis.

Duration: Seven years.

Condition: Pain, heat, stiffness and impairment of motion, chiefly in the fingers. Some atrophy of forearm.

First operation: April 13th 1881. Stretching of median nerve.

Result: Aggravation of the morbid symtoms.

Note: Patient had to be sent to asylum for mental deseases.

Second operation: May 23rd. Stretching of median nerve at elbow. Immediate effect: insensibility and paralysis of the two first fingers.

Result: No alieviation.

Third operation: June 7th. Section of median nerve in the lower third of forearm.

Condition of nerve: Atrophied and adherent to tissues.

Result: Insensibility of first two fingers. No improvements. Patient not heard of again.

CASE IX. A. P.

Diagnosis: Myositis ossificans of the brachialis internus muscle, causing paralysis of the cutaneous branches of the radial nerve in the hand.

Duration: Eight months.

Condition: Sensibility to pain retained, but other sensibility so much disturbed, that patient drops his tools when at work.

Operation: May 26th 1886. Excision of morbid growth. Cutaneous nerve freed from adhesions and stretched.

Result: Cure, immediate. No news obtainable.

CASE X. G. A.

Diagnosis: Neuritis of peroneal nerve with consequent paralysis, following an operation for genu valgum.

Duration: 12 weeks.

Condition: Partial paralysis. Peroneal nerve near the head of fibula painful to pressure. Electric reaction slight.

Operation: February 28th 1881. Nerve stretched and freed from adhesions.

Condition of nerve: Much thickened and reddened.

Result: Cure. Same day.

No relapse after 6 years and 9 months.

As an *immediate,* but *transitory result* of the operation in two cases (6, 8) there was *diminished sensibility.*

Length of duration of complaint before operation. Cases cured (5, 9, 10) from a few weeks to a few months. 6, 7, 4) one, two and four years respectively. Case 8 failure. 7 years.

Period after operation at which cure insued. In two cases (9, 10) immediate. In three cases (3, 6, 7) within a month. Case 4 gradually, complete in eight months.

In three cases (cured) the nerve was *hypertrophied.*

We have then eight cases of morbid symptoms in the

region of one nerve all treated by nerve stretching, seven cured and one failure.

Unfortunately only two of these cases could be traced for any satisfactory period of time, no relapse having occured during 6 years 9 months (case X), five years (IV), three years (VII) and one year and a half (V, VI).

In five of these successful cases, the disease had a *traumatic* origin, which might suggest that *traumatism* was a *favourable indication for the operation.*

In three of these cases (7, 9, 10) the favourable result may have been partly *due to the freeing of the nerve from adhesions.*

In the one case of failure there are certain conditions to be taken into consideration; i. e, first and chiefly that of the nerve, which was *atrophied*, next that of the patient who laboured under much mental excitement, and last the length of time, seven years, during which the malady had lasted. Further it must be noted, that the third operation, of nerve section only, was performed in a different situation to that of the two former ones of nerve stretching, and that it was in this last situation only, that the nerve was *atrophied* and *adherent* to the tissues. Here then, it may be assumed, was the real focus of the disease, and I venture to suggest, that had the nerve in this operation been freed from its adhesions and perhaps also stretched as well as cut through, the results might have been more favourable. Also, while fully admitting that this was a case of failure, we have a right to remember, that this patient persisted in leaving four days after last operation, and has not been heard of since. Had case 4 been lost sight of four days after

the operation, it would also have been set down as failure, being in fact the most satisfactory of the series.

Is must be admitted then, that nerve stretching has its proper and most valuable place among the curative measures at the disposal of the surgeon. At the same time, like other therapeutic measures, it will sometimes fail or may possibly even aggravate the evil it was intended to remedy. Nor can a certain forecast of results be always made, therefore considering the inconvenience which an operation must always entail on a patient it would seem more suitable to resort to it, after other and less heroic remedies had failed rather than in the first instance. On the other hand, it has often succeeded in obstinate cases which had resisted all other treatment. Its good results are often most rapid, appearing sometimes on the very day of the operation, a brillant result to be obtained by no other known remedy. The operation also does not seem to be attended by any serious risks.

In conclusion, I beg to offer my sincere thanks to Professor Kocher for allowing me the use of these extremely interesting cases, in the perusal of which lies the whole interest of the present essay.