Neuralgia and its regional treatment, with a special operation at the foramen ovale

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MD

1897

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Neuralgia and its Regional treatment, with a special operation at the Foramen Ovale.

Thesis for the M.D. degree by

Alfred F. M. Paget.
On Neuralgia and its special regional treatment:

On looking over the literature of the subject of Neuralgia, outside what may be found generally in the text books of the Practitioners and Students one cannot but be struck by the large number of those afflicted, who have under the different writers, been cured or relieved for a time, by remedies almost as numerous and varied as the writers. That this success has been due to the application in certain regions only of special treatment, would seem to account for their success & subsequent disease when applied generally. Some writers giving but scant time to the localities or conditions present.

As regards therefore the medicinal treatment, the clearer definition of those remedies which are found to be of special value in certain regions is to be desired. Especially is this the case when it is considered how often the predisposing cause has alone been taken into account in those long under treatment. As arsenic or quinine, who failing to get relief, are found with some other disease, which may so frequently be present. Their experience of failure under drugs driving them early to the surgeon, with eager desire for operation, rather than attempt further medicinal treatment or delay. That prompt treatment is called for in all cases where it is possible, is
well understood, for not only is the intense burning or cutting character of the pain in some patients which may well be likened to that of cancer to be considered, but also the powerfully debilitating effect, which in those cases, which do not come under prompt treatment from the first, seems to render those afflicted easier victims to future attacks.

The definition of a functional disturbance giving rise to a special kind of pain affecting a nerve or its branches has been generally accepted for this condition. As regards the age of those affected, it is rare in those that have not reached puberty. (Anita on Neuralgia and Allied Neuroses, page 22.) Remarks that severe Neuralgia in young children, if it cannot be traced to tuberculosis, or organic brain lesion is ground for suspicion of precocious sexual irritation, though occasionally produced otherwise. It is also notable that the tendency to first attacks diminishes after mid life; and very rapidly so in old age. E. V. Gibson in (An Analysis of 400 cases of primary sciatica) in The Lancet of 1893, page 860 gives the following consecutive cases, and this corresponds pretty closely to the ages of those affected by Neuralgia, generally if the number
of those affected between 21 and 30 change places with those between 51 and 60.

Tabulation given by Dr. E. V. Gibson as above:
14 cases below 20 years of age.
157 between 21 and 30.
310 between 31 and 40.
248 between 41 and 50.
187 between 51 and 60.
71 between 61 and 70.
11 between 71 and 80.

Women seem to be slightly more frequently attacked by neuralgia generally than men, but in the above tabulation of cases of sciatica only 116 women were found as against 184 men. It seems rare however in the robust and healthy otherwise, in either sex who lead active lives; but as the chief predisposing cause to attacks, seems to be an unstable nervous system, through hereditary neurosis it is hardly to be expected that such patients should be leading lives as active and healthy as the majority of their fellows. The chief hereditary causes seem to be Hysteria, Insanity, Epilepsy. As regards Rheumatism Austin page 135 in his book on Neuralgia and allied Neuroses, comments on its rare connection; and on Gout the above authority August Eulenburg (Austin page 136) in its very
rare connection and remarks on the uselessness of Colchicum in its treatment.

Among the debilitating causes may be mentioned Malaria, Anaemia, loaded bowels, uterine disease Calculi, deficient food, Religious self-conscionness, over lactation, Physical fatigue, Depressing emotions, exposure to draughts, Peripheral irritation of sensory nerves as worms, decayed teeth, or continued straining of the eye, or the toxic agencies of Alcohol, lead, Diabetes or Syphilis and Austie (Neuralgia and Allied Neuroses page 25) quotes a case of Mercury poisoning.

All these causes seem to act by their depressing influence on the health where there is a tendency to the Neurosis.

The influence of organic changes is shown by Eichhorn in his lectures on Surgical Pathology page 627 where he remarks on tumours in structure and relationship exactly similar, some being extremely painful, others almost painless, though the mechanical involvement of the same nerves must have occurred. So with fibrous or peritoneal thickenings and the presence of dead bone which are given by Eichhorn (in his Science & Art of Surgery Vol II page 25) as causes; It seems that pressure except when accompanied by neurosis is an insufficient cause to account for the pain.

Austie also on page 14-16 of his book on Neuralgia
remarks the tendency to Neuralgic disturbance of nerves other than those directly affected as observed in those wounded during the American civil war; and Surgeon-Patent (Surgical Pathology) page 470 notes Neuralgic pains long after the removal of painful tumours. Whilst Droussean (Clinical Medicine) Vol 1 page 487 notes the intermittent or periodic character of the pains in uterine cancer; and page 494 that tumours may give rise to real Neuralgia.

The situations generally affected are (Pichon's Elements of Surgery Vol 11 page 22) the trunk or branches of a nerve, generally the 5th, and of this nerve the infra-orbital branch most frequently. The intercostal nerves and posterior branches of dorsal spinal nerves, the Testis, breast, uterine organs, and larger joints less frequently.

Droussean (Clinical Medicine Vol 1 page 488) draws attention to the cause influencing the seat of the pain. Thus: 'In Chlorosis the pain is found at several seats at once; the trigeminal nerve and Solar Plexus being especially affected. In Meurine disease as Luescorrhoea there is generally Gastric or Intestinal Neuralgia; the Optic nerve being liable to attack especially in cases suffering from Marsh Miasma. The Occipital and Sciatic Nerves in the Rheumatic.'
before the commencement of pain are, a paleness of the skin
with sensations of chilliness, shown to be accompanied by
an increased arterial tension by the sphygmograph
and probably due to a spasm of the small vessels.
This is followed by a congestion of the parts.

J. J. Putnam in Putnam's System of Practical Medicine Vol V
page 1292 quotes a case of Dr. Mitchell where pain
was always preceded by thirst. Another symptom
sometimes observed to precede pain is remarked by
Anstie page 165-166 (Neuralgie et allied Nerves) That of a
partial anaesthesia.
The pain may be superficial or deep seated along the
course of the nerve or nerves affected; or, according
to Ericsson (in his Science & Art of Surgery Vol ii page 24) it
may affect the surface without reference
to any special nerve. The pain is generally
unilateral, but may be bilateral or asymmetrical, with
liability to spread from one nerve to another.

Generally intense, with irregular intermittent or
remittent character, and having in the Malarial
form at least a tendency to periodicity. A
more moderate pain but with acute exacerbations
is also frequent. In any case however the pain
seems practically out of proportion to the constitu-
tional disturbance, though it is increased by
physical exhaustion, and in all clear cases
there is an absence of organic lesion of the
nerve or of parts connected with it. Anstie
(Neuralgia and Nerve) lays stress on the fact, in this connection, that continuous pain arises usually from peripheral irritation, whereas proximal pain occurs where a nerve trunk is involved, and a lightning-like pain where the spinal cord is affected. A marked tenderness seems however to be present in all cases, with the exception of those who have met with prompt and effectual treatment from the first, and in whom the hereditary influence is not marked.

There is generally over the affected area on the skin, a hyperaesthesia present, varying in intensity though yielding to deep pressure which occasionally affords some relief as is often observed by that instinctively exerted by those affected; and this constantly repeated pressure or friction is seen sometimes when it has been long continued to visibly alter the symmetry of the part.

Not only may the pain spread from one nerve to another, but it may spread from branch to branch of the same nerve, and this spreading character becomes of some interest when the direction of the spread is found to correspond with the arterial distribution of the part, and a prediction of the direction that will be taken is considered. The symptom of great interest by reason of
its absence, is that of change in the body temper-
erature when it is remembered how severe
a shock must be experienced by the system
in a severe even though short attack.
In some cases the apophyseal tender point
of Trousseau over the vertebral spine cor-
sponding to the affected nerve is present, or
in the case of the 5th nerve over the
1st and 2nd Cervical vertebrae Trousseau Vol I page
480 (Clinical Medicine).
Certain reflex disturbances may occur during
any acute attack and these will be dealt
with later under the consideration of the
complications which may occur.
Following an attack there may be observed
in some cases an abundant secretion of
With locally, some anaesthesia of the affected
part—Anstie (Nurs. All. Nurses p. 9). This is
rarer than the hyperaesthesia and generally
in the cases of Rheumatic origin Trousseau
Clinical Medicine Vol I page 485. The tender points
of Valleriu occur when present where the nerve
may be subjected to pressure, where it passes
over or makes its exit from bone, where it
perforates the fascia or at the possible weak
points of division or anastomosis.
Among the following varieties of neuralgia are some which have but scant recognition; where however varieties as all distinctly have been described, they have as far as possible been tabulated.

Cerebral neuralgia. Under this heading cranial affections are considered. Much of the older literature on this subject is of doubtful value, as it seems to have been not infrequent for gross lesions to be described under this heading. Amsté (Neuralgia and Allied Neuroses p. 86-88) gives a series of cases of this condition. In one case at least there was a daily recurrence relieved by sleep and rest. He gives the situations where it is most likely to occur as (a) Anteriorly where Amsté recurrent branch is given off from the opthalmic division near the Della Turcica. (b) In the peripheral twigs above the branch distributed to the tentorium cerebelli.

Epileptiform neuralgia. The term derived is the same quin to trigeminal neuralgia when the pain is intense and paroxysmal. (Eichorn, Science of Surgery Vol. 111, page 27). Though the name die toulourence is confined to Convulsive Epileptiform neuralgia by Dr. Meaux (Clin Med Vol. I, page 105) who observes also (page 110) that in some cases it is a manifestation of true epilepsy which
comes on later.

under the first division of the fifth nerve, the neuralgias of importance are those in which the eye is affected and which will be considered under the complications of this affection; and supraorbital neuralgia.

Supraorbital Neuralgia. In this variety there may generally be found a tenderness over the supraorbital notch, pressure over which may instantly give rise to a paroxysm of pain. Brow Ague is a term frequently associated with or used for this variety from the frequency with which this form occurs in those affected by Marsch Miasma, in those affected the attacks of pain generally show a marked periodicity. Pepper (Pract Medicine Nov. 1912) mentions that the pain often resembles that of Neuralgia in that it is worst at night. Special seats of pain are found at the supraorbital notch; on the nose at the junction of the nasal bone and cartilage; and on the scalp above the zygomatic bone of that side. The upper eyelid and eyeball may also be affected though more rarely than the above situations.
In the second or Superior Maxillary Division of the fifth nerve pain is again noted as occurring at special points. These are given by Friedrich (Science of Art of Surgery, Vol II, page 23) and are at the infraorbital foramen, over the Maxillary foramen in the Maxillary bone, and along the upper gum and palate.

In the third or Inferior Maxillary Division most authorities seem decided as to the general localities where pain occurs, namely at the Mental foramen, along the side of the tongue, in front of the ear, and in the lower lip and jaw. The specification of these localities, although at first sight unimportant in the treatment of many cases is undoubtedly of importance when endeavouring to determine the existence of such exciting causes as are known to exist in these regions. Whilst the limitation to one division only of this nerve must in most cases be taken as a favourable prognostic, as showing a tendency to a localization which in itself is easier to deal with either surgically or by mechanical medicinal measures as are suitable for the region.
Cervico-occipital neuralgia. This variety is bilateral with some frequency, and the pain is less often of the acute intense character than continuous with occasional exacerbation, that is, the intermittent character is not as a rule well marked. The painful regions comprise the distribution of the great occipital nerve in the posterior triangle over the braehial nerves, and over the parietal prominence.

Dreier-Taylor (Practice of Medicine page 357) says that Cervico-temporal neuralgia may be caused by Carious Teeth.

Cervico-brachial and Brachial neuralgia occur over the area of distribution of the Brachial plexus. Tender points are found in the axilla, at the posterior border of the deltoid muscle, behind the elbow, and at the front of the wrist. (Dreier-Taylor, Practice of Medicine page 356)

Laryngeal neuralgia. This may affect the voice. In the case quoted by Graves Clinical Medicine Vol. page 656 there was a daily periodicity present. In such cases as come fairly frequently under observation with a history of pain in this region and from having according to the patient swallowed a pin or such like body...
following which they have some loss of vocal power; such cases, must in most, where no foreign body, or organic change or cause is found, present, be taken as an hysterical manifestation, although such patients may have a fairly clear history of previous pain of neuralgic character in other regions; and medical as well as medicinal treatment will be called for.

Pharyngeal neuralgia. Austin/Maliga & Allies (p. 88) describes this as occurring with involuntary deglutition and increased secretion; being caused by an affection of the glossopharyngeal nerve.

Neuralgia of the Breast. Enichem (F. Revue et d' Histoire du Mal des Os, Vol. II, p. 166) under the heading of Myalgia, describes the condition, in which no inflammation, induration or nodular growth being present, pain is felt in this region. It is said to be more frequent in France than elsewhere. The pain is described as paroxysmal, radiating in all directions, generally worst at the menstrual periods, rarely persistent, and generally accompanied by hyperesthesia of the part, with however less pain on deep pressure. Most often seen in emotional and anaemic patients. Graves also
Clinical Medicine Vol. 1, page 660 quotes a case.

Intercostal Neuralgia. This is generally continuous with exacerbations, the pain occurring in the intercostal space. Its neuralgia origin seems to be generally accepted when it is accompanied by tender points in the following regions. On the spine, corresponding to the dorsal nerve affected, in the mid axillary line, and near the middle line in front.

Lumbar Abdominal Neuralgia. This neuralgia corresponding with lower dorsal nerves. The tender points in this variety are found near the spine, at the mid point of the iliac crest, at the lower end of the rectus muscle, and more rarely a sentient or habital point may be discovered.

Crural Neuralgia. This seems to occur but very rarely. The pain affecting the region supplied by the lumbar nerves.

Neuralgia of the testes. Erickson (Science and Art of Surgery, page 123, Vol. 11) says this may occur either in the epididymis or body of the organ. The pain may extend along the cord. It occurs especially
in young men with mental depression, the cause seems frequently to be essentially dyspepsia, external piles, masturbation (and the Neuralgia and allied Nerves, page 66). Varicocele or Gout which tends to affect the left testicle especially in a predisposed subject. Graves in his Clinical Medicine Vol.1 page 663 quotes two cases.


Neuralgia of the Hip. This occurs generally in girls. The pain is superficial and widespread and not limited to the joint. It is generally in those having an Hysterical Temperament. There is apparent lengthening of the limb from an obliquity of the Pelvis, which disappears on lying down. This is not the case in Sacroiliac Disease (Erickson Vol.ii page 406 Science & Art of Surgery).
Neuralgia of joints. A pain of neuralgic character frequently occurs in joints as the result of organic lesions. Pain, of a neuralgic character may however closely simulate such conditions. It generally occurs in nervous young women though this is not always the case. The hip and knee are often thus attacked, the shoulder and ankle less frequently. The pain is superficial and is not increased by pressing the articular surfaces together, nor is the pain local only but is often complained of elsewhere and is intermittent. The starting sudden pains at night are notably absent. There is no inflammation swelling or elevation of temperature to correspond with the pain. (Friction believe that Surgery Vol II page 368) Attacks seem to be increased by mental worry.

Ironman (Clinical Medicine Vol I page 492) remarks on Neuralgic pains alternating with Rheumatic pains in the joints in succeeding attacks as seen in non febrile Rheumatism.

Sciatic Neuralgia Anstie (Neuralgia & Allied Neuroses page 46-52) says this occurs in mid life usually and is found sometimes in those debilitated by Syphilis, Rheumatism or Leprosy though he carefully draws
attention to a bilateral case with truly in-
ferent pain which extended to the cutan-
eous branches of the crural nerves, in which
there was no such history. Neither syphilis
Rheumatism or gout being present. He observes
the frequency with which anaesthesia is present
as a complication, there being diminished
tactile sensibility, as there are both moto-
and sensory filaments in the great sciatic
paralysis of motion may occur by involve-
ment: or convulsive movements may occur
at night in some cases. Ariste (page 37)
observes that movement seems to keep
up neuralgia in the limbs.

Morton's Metatarsalgia. This is considered by
some to be a neuralgia though undoubtedly
a rare one, in which the metatarso-phalanged
articulation of the foot is affected. S. O. T. Osborne
in the New York Medical Journal 1895 page 270
gives a case which was quite clearly
one of neuritis however, for which excision
was done, and followed by the temporary survival
of the patient, who was therefore considered
as cured. Such pains as are described
might well in many cases be caused
by the stretching of the Plantar arch
ligaments in those who have been long standing.
Gouty Neuralgia. Graves (Clinical Medicine Vol I page 5-38) describes a case in which the patient had pains in both feet. This gradually after five years had spread to the hips. The pains had a tendency to weekly periodicity; they were rarely of long duration or in both limbs at the same time, though flying instantaneously from one limb to the other. There was no redness or swelling, but some weakness after the attacks. The pain was markedly relieved, or was brought on, by pleasurable and painful emotions as the case might be. Gentian in this case gave a good deal of relief.

Angina Pectoris. In contention that this may be due to a Neuralgia of the heart, Astée (Neuralgia and Allied Neuroses page 72-73) quotes certain cases in which post mortem no lesion was found. He also mentions the apparently authentic record of a whole ships crew who were attacked by an epidemic angina-like pain, in this case the change of climate seemed to be of great benefit.

Gastralgia. Astée (Neuralgia and Allied Neuroses page 83-84) writes regarding this affection that it seems to have a predilection for Neuralgic subjects who are at the time
prepossessed by physical exhaustion. It is frequently accompanied by palpitation. The blood tension being at first high then low. No organic lesion is to be found. Brownsee (Clinical Medicine Vol IV page 21) observes that in dyspepsia there is sometimes a loss of tactile sense along the inner side of the forearms with Neuralgic pain of the parts. Peper (in his Practice of Medicine Vol V page 1214) observes that these patches are more clearly marked than is the case with organic lesions, and differ from the latter in being rapidly restored by paracentesis.

Neuralgia of the Urinary Bladder. Erichson (Science & Art of Surgery Vol 11 page 1127) writes of this condition that the pain may be severe, and either continuous or remittent and that it is most likely to occur in Hysterical or Hypochondriacal patients or to be sympathetic to disease in the Rectum, Kidneys or Uterus.

Neuralgia of The Coeleg. Sometimes occurs but the condition seems to be generally due to a dislocation of the parts and the pain due to a mechanical cause.
On consideration of the large number of possible varieties, the differential diagnosis of Neuralgia, must in some cases be difficult. The following points are however sufficient in most cases to differentiate the condition from other simulating affections, and the more important organic changes. The diagnosis from the four following conditions are given by Krichen in "Surgery," Art. 111. Vol. III, page 25, 314, and 388 respectively.

From organic disease of hip, knee, testis or breast. By the existence of heightened cutaneous sensibility.

By the patient exhibiting signs of an hysterical temperament. By the absence of definite characteristic signs of an organic lesion of the part.

From inflammation. By the intermittent character of the pain in cases of Neuralgia. By the absence of the constitutional disturbance accompanying inflammation. Neuralgia is fairly frequently relieved by pressure, unless there is great cutaneous hyperaesthesia. In inflammation there is practically no cutaneous hyperaesthesia, and the pain is definitely increased by deep pressure.

From Aneurism. This condition is apt to mislead rather more than the other conditions. In Aneurism the pain frequently complained
of has a double character being both lancinating and paroxysmal, as well as continuous, aching and burning in character. (Page 119)

From Spinal Caries. In this condition the pain is continuous and fixed in that situation. There is marked tenderness on pressure. There is increased sensibility to heat. The pain is greatly increased by additional weight supported by the back. The spine is rigid, and the age of the patient who is frequently below the age common for neuralgic affections (Eichsen page 206 Vol 1).

From Migraines. This is generally accompanied by optical spectra. The pain is usually described as burning in character and influenced for the worse by movement, light or sound. (Foster Taylor Practice of Medicine page 321)

From Hysteria. The pain shifts irregularly anywhere, and the pains are usually described as of burning or burning character (Austin Neuralgia Allied Neuroses page 243)

From Neuritis. In this affection of Neuritis muscular atrophy tends to be present, and is seen with special distinctness where the limbs are affected.

From Organic lesion of a sensory nerve there is persistent anaesthesia, atrophy of muscle, and lasting Trophic
changes, but in cases of doubt the long duration of the case would be probably in favour of neuralgia.

From Myalgia. The pains in this affection are found to be relieved if the muscles are kept on the stretch for some time. (Annie Neuralgia Allied Remedies page 212).

From Syphilitic disease of bone, neuralgic pains in connection with bone occur over the point of exit of the nerve from the deep structures to the superficial. Obscure syphilitic pains are not so localized. In syphilitic disease of bone there is also the absence of the tender point over the spine. (Trusnac Clinical Medicine Vol.1 page 493).

From Periostitis. In this there is no tender spot over the spine and no cutaneous hyperaesthesia. Trusnac Clinical Medicine Vol.1 page 497.

Complications: - The complications of this affection are fortunately not as a rule serious except in the case of the eye affection. Though the fact that a sensory nerve or nerves are involved is sufficient to remind one that a fairly wide field of changes may occur. As regards the eye Rotta made a valuable analysis of 128 cases of trigeminal neuralgia which is quoted by Annie Neuralgia Allied Remedies.
In 10 cases out of the 128 Notta found that the region was paralysed or almost so. In 9 other vision was interfered with, and in 34 the conjunctival vessels were dilated. That is that more than a third of the total number were affected in some way: and this seems the more important when the large number of cases that are probably overlooked at first as regards their eyes are considered. For with the improved and ready methods at the disposal of every oculist, the fact that the pains may be referred, or originae in, a condition of increased ocular tension does not seem to be often appreciated, and even the most casual examination in trigeminal neuralgia is neglected. Antique notes however (Antique, Addler no. 102) Glaucoma following neuralgia of the above nerve, and further on page 105 that out of 100 cases no less than 28 had paralysis of some eye muscles. Antique again pages 102-105 comments on Notta's 128 cases. No less than 52 of these were found affected by muscular spasm. But as regards anaesthesia only three out of the whole 128 were found affected.

Hyperesthesia. Regarding this condition the only fact of interest seems to be that some though a few only have shown an increased sensitiveness.
-ness to sound.

Thickening of tissues, the skin especially may be thickened and pigmented, more rarely swellings may occur over the bones very much resembling the nodes of syphilis, pressure on these nodes may give rise to pain, in some cases even to reflex vomiting (Astro Neuralgia + allied disorders page 94-96).

Unilateral funneling of the tongue may occur as in a case given by the above author on page 97. He also refers to his own case on page 94 with reference to atrophic changes in connection with the hair. His altered in colour during an attack but returned to normal afterwards. Falling out of the hair may also occur.

Hypertrophic changes may occur such as the coarse growth of the hair. Cohnheim (Pathology Vol. II, page 719, states 91o, on the hypertrophies of the skin, connective tissue and bone which may occur from oft repeated attacks of neuralgia accompanied by congestion of the parts.

Reflex secretion, this may occur from the lacrimal gland, the nose or the skin, edema has rarely been recorded. Unilateral sweating is recorded by W. Ringer in the London Practitioner for 1872, page 137-140.
Herpes Zoster. In favour of this having a connexion with Neuralgia Autie (Neuralgia and Allied Neuroses page 90) remarks that the pain in this affection increases as life advances, being comparatively slight in young subjects. Brown-seam (Clinical Medicine 1871 page 295) thinks that in the old the pains following zona are Neuralgic as they may change their position.

Under the designation of Pathology the author proposes to mention such points as seem to be supported by fairly recent authorities; without entering on the realm of hypothesis further, he then goes on to state, being fully conscious of the deficiency with which such theories are borne out by facts, that the condition is markedly influenced by the blood supply seems probable as Autie (Neuralgia and Allied Neuroses page 9) notes that Neuralgic patients are liable to sudden changes in vascular tension, and that the period of life for arterial degeneration and Neuralgia are the same (page 138) though the interference with the blood supply to the parts (sensory centres in the cord or posterior root ganglia) may be temporary (page 144).

Cohnheim (Pathology 1871 page 116) notes the frequency of a tonic contraction of the vessels over the area of distribution of the affected nerve.

C. J. Dane (Medical News 1891 page 548) gives five cases in which three were found to suffer from
Vascular degeneration, and in the other two cases no blood vessels were to be seen. His argument being in favour of arterial degeneration, the time of life corresponding with that grade of disease, and in the case of the fifth nerve the spread tending to follow the distribution of the branches of the internal carotid, whilst the supramedial branch is seldom involved at the same time as the second and third divisions of the nerve, the ophthomotor having a supply from the internal carotid, the things forward also the fact that drugs acting on the circulation are frequently found beneficial.

J.J. Putnam (International Clinicals 1894 Vol I page 134-140) mentions the thickening of the vessels found in some cases and shows a section, in which the pulsation of a vessel against nerve fibers in its sheath might give rise to pain.

Frederick Taylor (Practice of Medicine page 352) quotes Powers who says that neuralgia is a disturbance of the central nerve cells connected with the nerve trunk.

The division and the following degeneration of the affected nerve certainly seems often to have no effect, as the regenerated nerve is too frequently the seat of pain for superficial irritation to be the only cause. The fact of the almost invariably rapid regeneration of cut nerves would hardly be likely to occur if the nutritive supply were greatly at fault.
Regarding the treatment of neurotic affections it is proposed to deal with the subject under the heads of the medicinal and surgical. The medicinal will be further subdivided into a regional treatment and a general one; and these where certain drugs are found to be of special value they will be considered under the consideration of the region in question, being either for the purpose of guarding against further attacks or of active use during the time of its infliction.

That large numbers of the medicinal remedies, as well as many of the surgical remedies aim at giving rest to the nerve inclines me to consider this remedy first. That of resting the nerve or temporarily destroying it as in surgical procedures or lowering its vitality by cold, has, and does undoubtedly good. Short of surgical procedures, it seems generally desirable, considering that some abnormal process is at work, to aim in the giving of rest to the nerve rather to do so by such methods as may lessen its excitability than to lower its vitality as for example by cold.

In anaemic patients, preparations of iron, alone or more generally in association with other drugs as quinina, are of use. In the hysterical Valerianate of lime or arsenic oridea are often given. Sea bathing
and Turkish baths of short duration, and laxative waters have all been found beneficial in different cases.

The removal of any reflex cause of irritation as a decayed tooth seems advisable, but more than this, as for example, the wholesale removal of the teeth from one side of the jaw, as has sometimes been practiced, has not only not relieved but in at least some cases has aggravated the condition.

The administration of jalis and oils, especially cod-liver oil, seems in nearly all cases to be attended by beneficial results, where attention is paid at the same time to their proper digestion; combined with Bromide of Potas in those not debilitated the latter drug seems to be of service, or the oil may be well combined with the Oxide of Potas in the Syphilitics who have been given Mercury in large doses.

Exclusion of the air by means of flexible Collodion is a proceeding which can at worst do but little harm. Collodion with Belladonna or other Anodyne Luminents as Acidade or Opium seem often of much service, as they can with care be utilized in most situations.

With regard to Morphia it seems advisable to keep below or not higher than a dose of 1/6 of a grain, 1/2 of a grain being the more advisable dose subcutaneously, as the narcotic effect of this drug is undesirable. Should
such does prove ineffectual, it would seem better to substitute Atropin, in small doses subcutaneously, or Galvanism & counter-irritation over the spine, with a mustard leaf or blister, should pressure be able to elicit definite pain over that region at a level corresponding with the origin of the nerve from the cord.

Leeches and decapsulation seem now almost obsolete as methods for usual employment. Compression of the part, this must be contra-indicated as lowering the vitality of the part. Even as a drug seems to have but little if any benefit.

Chloral or more especially Butyl-Chloral Hydrax is undoubtedly regarded by some as of great use. The latter especially in neuralgia of the fifth nerve, the action however seems to be frequently negative, or to have an effect so depressing to the patient that except in Hospitals they refuse to continue the use of the drug, and this may also be said of Gelsemium, the first done being the only one the patient in one case was induced to take, though the authority consulted on this occasion was one of great repute.

Sodium Menthol applied to the part seems to be of some temporary benefit in many cases.
Cyanide of Potassium 3/4 aqua 3x was advocated by
Droumeau, Vol 1 page 296.
Counter irritation by the cautery or blister seems best when
there is tenderness over one or more vertebral spines.
Irrinatentia may also be used for this purpose.
Phosphorus is advocated by S. Bartley in the
British Medical Journal for 1874, page 344. And the
Hyposphosphites are especially recommended by
Ansell (Neuralgia and allied neuroses page 207) where
anaesthesia is found associated with the
Neuralgia.
Arsenic seems of general benefit, and more
especially so in malarial cases of the infra
orbital nerve.
Aconite. The Tincture is very highly spoken of
by Graves in his Clinical Medicine (Vol 11, page 282).
Cannabis Indica, Ether, and Nitroglucern are
sometimes called for under conditions
where other drugs fail, though they do not
seem to be of special use.
Ergotin has often proved itself of value where
the pain is intracranial.
Sodium Chloride will be discussed under the
Neuralgia treatment affecting the fifth nerve.
Gonga a remedy for neuralgia used by the
natives of the Fiji Islands was written about by
Dr. Ringer and W. Murrell in The Lancet for 1880:
page 360. A liquid extract of this drug.
was prepared by Allen & Hanbury, and had at that time been tried in eight cases. Six were promptly cured, one was improved, one failed. No later mention seems however to have been made of the drug.

As regards Electricity, the alternating current seems of use in hysterical cases of deryngeal pain, especially where they are of short standing. Rheumatic electricity, that is applied with a wire brush pole does not seem very successful.

The constant current is discussed under sciatic pain, and its treatment. Percussion - light and rapid percussion by the Perentin has in some cases proved very successful in the hands of those who have practiced its use.

Ophthalmic Neuralgia. Besides the special treatment indicated by the different complications that may occur in the eye (glaucoma, irritis &c.) quinine seems to be of very great use in neuralgias in this situation according to Anski (Neuralgia & Allied Neuroses page 177-185).

Supra Orbital Neuralgia. If periodic quinine or arsenic in full doses are advised by Dickse
The fifth nerve, seems especially benefited by arsenic. In alcoholic aminin followed by a course of cod-liver oil is generally preferable, as causing less gastric irritation.

Cotton wool soaked in a 20% solution of cocaine may serve temporarily to relieve the pain if inserted into a carious tooth, where dental irritation is present.

Electrical treatment in the region of the fifth nerve has not proved very successful.

G. Leslie in the Edinburgh Medical Journal for 1889-90 page 614-621 has given a remarkable series of 40 cases, where odontalgia or trigeminal neuralgia seemed powerfully modified or relieved by the insufflation into the incisors holes of sodium chloride, generally about 10 grains of the 40 cases only one seemed to have failed and three only improved but partially successful.

Cervical occipital neuralgia. Here blistering over the tender points or painting with Collodion Belladonna has met with some success.

Electrical treatment seems rarely to affect the pain.

Gouty Neuralgia. Here the treatment being chiefly directed against the gout it is only worthy of
Special note. That a too energetic treatment by depressing drugs such as Colchicum is apt to greatly aggravate the Neuralgia.

Rheumatic Neuralgia. If exacerbations occur at night, besides such anti-rheumatic treatment as may be adopted twice or three alone or with Quinine seem beneficial.

Gastralgia. Brandy or other Spirit in tablespoonful doses every few minutes till Bips-ii have been taken is a frequent treatment. Strychnine has also been found useful; if given with iron it is also found to act well, though Strychnine may cause some restlessness at night.

Mammary Neuralgia. Astle (Neuralgia and Allied Neurones. page 197) advises the use of Acetile in this situation to lower the sensibility of the part for a few days. When Acetile is not employed he advises Veratrine, but lays stress on the Veratrine being used weak, as unless this is done it is no longer anaesthetic but becomes an irritant in action. On page 44 he recommends rest & protection from the air with morphia as frequently of use, and on page 207 he notes that intercostal neuralgia is hardly ever benefited by electrical treatment. Graves in his
Clinical Medicine Vol i page 660 quotes a case which was found beneficially treated by the Carbonate of Iron in 3i doses Taken once daily.

Neuralgia of the chest. The application of cold to the part seems to have marked good results and in this situation it is strongly advised by Austin (Neuralgia Allied Neuroses page 197) in contra distinction to its application elsewhere. Erichsen (Science & Art of Surgery Vol ii page 1289) says the treatment should be directed against the cause such as Dyspepsia, External Piles, Varicose veins if present. Most cases he observes are chronic, and advises sea bathing, wearing a suspensory bandage & the application locally of glycerine & helena donna.

Herpes Zoster. Blistering over the spine has been advocated, with a caution as regards the aged or weak. Chloroform liniment or a mustard plaster may be employed. The situation advised for such applications being over the spine corresponding to the branch of the nerve affected. Morphia or atropine may also be employed in these cases. Anise Neuralgia (called Neuroses page 190).

Sciatic Neuralgia. Electricity is of much use in.
these cases, a weak constant current should be employed, which should only produce a slight redness and tingling of the skin. It is best applied at regular intervals of once or twice daily for 5-10 minutes with the positive pole over the seat of pain. It is well to continue the treatment for some time after the subsidence of the pain. (Another Neuralgia-allied nervous page 207).

In cases of Hysterical Contracture of the limb wrenching under an anaesthetic has been performed. In other cases, and what seems most frequently done at the present time is gradual extension by the weight and pulley. The patient's bed being made into an inclined couch by blocks under the foot end.

Surgical Treatment:

St. Vitus' Dancing. This seems to have been first advocated by Walcham in the Proclamation of 1884. The relief afforded seems very rarely to be permanent, and but seldom over three years. In small nerves the conductivity seems completely abolished for a time, not so in larger nerves, so that Richardson (II, Science of Surgery, page 2728 advises that the operation be confined to small nerves. Neurotomy has now generally given place to
Newcoting, as affording a longer temporary relief, for temporary relief only, can be generally promised, where the superficial branch only is dealt with, and the risk is always present that the pain may be merely transferred to another branch of the nerve.

Operations on the ophthalmic or 12th division of the 5th nerve. The frontal branch of this nerve is only cut or stretched as a rule. It may be stretched instantaneously through a small puncture to either side of the infraorbital notch, the skin of the forehead being pulled up to render the nerve tense, or a curved incision below and parallel to the eyebrow may be made the skin over the forehead being pulled up and the eyelid down. The incision should be about an inch long with its middle opposite the notch. The abducensarioris fibers are separated and the nerve exposed so it leaves the orbit. It may then be cut or stretched or traced back to the division of the frontal nerve, and thus the infraorbital nerve may also be cut, which lies at the point where a line drawn from the angle of the mouth through the inner canthus of the eye meets the margin of the orbit. Neubauer (Surgery Science, Art of Surgery, Vol. II, page 27-28) Berard recommended a T shaped incision for cutting the infraorbital nerve (Valleix Traité des Neuralgies 1841-).
The observations of Hütin are here worthy of note, his experiments going to show that the removal of five inches of a nerve are necessary to prevent reunion of a nerve with anything like certainty (Grundrisse der Chirurgie, i. page 114).

Victor Horsley in the British Medical Journal of 1891 page 2253 points out that one of the reasons for want of relief to be obtained permanently in neurectomy operations is that the nerve is often not properly freed in its bony canal which he considers important especially where the 2nd division of the fifth nerve is involved. He also advocates resection removal of a part of the healthy nerve.

The maxillary nerve may be reached with an eye from the infraorbital foramen.
1. In the infraorbital canal.
2. In the ethmoidal canal from which it crosses.
3. In the zygomatic canal from which it crosses.

At 1. it may be found (infraorbital nerve) half an inch below the orbit in a line drawn between the zygomatic notch and the internal between the two bicuspids teeth on the lower jaw. The nerve is here just below the foramen close to the bone. To stretch the nerve the upper lip and cheek are drawn downwards and the incision as arranged as to fall in the lines of the face. The nerve will come into view after the skin incision.
has been made and the levator labii superioris has been cut through. As the anterior dental branch has been given off. This operation is useless where the teeth are affected. (Erichsen Vol;ii Science and Art of Surgery page 29.)

Dividing the nerve in the second situation has for its object the cutting off of the anterior dental. Melgaigne advises (Manuel de Med Opératoire 4th Edit. page 133.) Incision parallel to and 1 centimetre below orbital margin. Cut fibres of orbicularis palpebrarum till one origin of levator labii superioris, the nerve being exposed at the foramen. Morley at this point advises that the nerve as well as the artery be ligatured (British Medical Journal 1891 page 1141). The palpebral ligament being separated from the margin of the orbit with the fat and eyeball being pushed up exposes the floor of the orbit, when the nerve may be cut in its canal on the floor of the orbit with a strong tenotome which penetrates the antrum. The nerve may now be torn out with forceps. As there is some risk of suffocation in the antrum and orbit this operation has been modified by Langenbeck & Hulé. The nerve being cut simultaneously before entering canal. A puncture is made below the orbit commissure of the lid, and a blunt tenotome is pushed backward & downwards to the Sphen. Maxillary fissure along which it shaves, whilst
Tract is made at the infra-orbital foramen on the nerve till it is cut through, when it is pulled out.

(Enriksen Science & Art of Surgery Vol 11 page 29-30) Horsley (British Med Journal 1891 page 1114) advises that the foramen and canal to the sphenomaxillary fissure be opened up with bone forceps or the roof of the canal removed, the nerve and artery separated for the whole length of the antrum and the nerve detached from the base of the skull at the foramen Rotundum. If recurrence takes place he advises a modified Pancoast operation. The incision for the former operation as advised by Horsley is one along the inferior orbital margin with a short one at right angles to it over the foramen. He also advises that the eyelids be stitched together before commencing the operation.

Enriksen (Vol 11 page 30 Science & Art of Surgery) describes another method advocated by Braun, Liecke and Löwen amongst others who operate in the Pléygo-maxillary region. An incision from just behind the middle of the outer margin of the orbit is made to opposite the last upper molar tooth from the upper end of this incision another is made to the root of the zygoma. The malar and zygoma are cut & turned down with the naso-ethmoid attached. The fat with the internal maxillary artery & a plethora of veins is carefully pushed back if necessary some of the fibres of the temporal muscle
which are inserted into the posterior part of the Coronoid process of the jaw are divided. The posterior part of the Superior Maxilla is then used as a guide to the Ephemomaxillary fossa, where the nerve raised on a blunt hook may be divided or resected. The vessels in the fat are liable to give trouble if wounded. The molar bone is replaced and held by sutures. This is followed. This operation some risk of stiffness of the jaw.

Third or inferior maxillary division of the fifth nerve. The branches of this nerve, namely the lingual, inferior mental, zygomaticotemporal and mental have been operated on by the following methods though frequently without much permanent benefit. (Erickson Vol.11 page 30-31) Days of them that the following are the methods usually employed in operating on these branches:

The lingual may be reached from within the mouth, as it runs obliquely forward to the side of the tongue from a point immediately internal to the last molar tooth, being covered only by the mucous membrane, and well brought into view when the tongue is pulled outward to the opposite side when they may be cut or stretched by dividing the mucous membrane cutting towards the jaw.
The mental branch of the inferior dental may be stretched or divided as it emerges from the
dental canal, the foramen being directly below the
interval between the bicuspids teeth. A puncture
is made opposite the first bicuspis, at such a level
as will prevent its penetrating the mouth, and
through this a blunt hook is inserted dragged
along the bone catching the nerve. Another
method employed is by a small incision.

The main trunk of the inferior dental may be divided
from within the mouth by a short vertical incision
along the anterior border of the Ramus of the jaw
the soft parts and periosteum are turned from
the bone, and the nerve exposed as it enters
the dental foramen.

In the dental canal the nerve may be
reached by a trephine hole. This is not
very successful as regards results. The
nerve in this situation quickly reunites
in many cases. The incision lying well
hidden beneath the jaw, the parts being pulled
upwards during the incision, making it an
operation of but little disfigurement.

The Auriculo Temporal nerve is generally stretched
only, as there is some risk of wounding the
Temporal artery. This is done where it crosses
the root of the zygoma after emerging from above the parotid gland. As it lies behind the temporal artery, it may be exposed by an incision parallel to its course immediately in front of the trigus.

The buccal nerve may be reached through the mouth by an incision through the mucous membrane opposite the middle of the anterior border of the ascending ramus.

The operations being as before stated so frequently unsatisfactory, Erichsen quotes (Science and Art of Surgery on page 31-32) the following operations as advised by Horsley, Povey, and others.

The eyeballs are closed on the affected side by a horsehair stitch thru the skin of the lids.

An incision is made from above the root of the zygoma, in front of the trigus, as far as the angle of the jaw, where it turns forwards just below the lower border of the jaw, as far as the facial artery. This triangular flap is turned forwards and upwards till the anterior border of the mandible is reached. The edge of the parotid gland and the lower border of Stenons duct are then defined. The buccal fascia is divided transversely between Stenons duct and the highest branch of the facial nerve, then the edge of the fascia being held apart, the mandelis,
divided into two thirds. An electric light is used and
hot lotion to prevent bleeding. The periosteum is next
separated from the exposed portion of the jaw, and the
Sigmoid notch, posterior border of the condylid process and
the neck of the jaw defined. A trephine hole is made
over the dental foramen, and the bone between the
Sigmoid notch and trephine hole cut away. The
trephine hole being made 12-15 millimetres below
the Sigmoid notch. Drill holes may previously be
made where the bone will be cut away. On
dividing the periosteum on the inner surface
of the jaw the inferior dental nerve and
artery are seen. The nerve ligatured with silk
and divided at the dental foramen. It may
also be divided a short distance below the
foramen ovale by tracing it behind the border
of the external pterygoid muscle,
the lingual nerve which lies half an inch
internal to and a little in front of the inferior
dental may be similarly treated.
Pancoast seems to have been the first to propose
operating at the Foramen Ovale in The Phil-
adelphian Medical Times of 1872, a copy of which
could not be procured by the writer. His operation
seems to have been a trap door incision in front of the gland
and a flap including the masseter dissected off.
The tendon of the temporal muscle cut off the condylid
process, which was cut off at its junction with the
name of the jaw. The internal maxillary artery was tied, and the internal pterygoid muscle cut away. The nerve was cut half an inch from the foramen ovale.

W. Horsley's modified Pancoast-Salzer operation is well described by Ishihara Vol ii page 32-33. Science & Art of Surgery. A flap is turned down from the temporal region as far as the zygoma; the latter is divided & turned down with the flap. The upper part of the coronoid process together with the lower part of the temporal muscle is removed, and, finally, by detaching the external pterygoid muscle from the sphenoid with an elevator the foramen ovale is exposed. The bone between the foramen ovale & Rolando may be removed with a long handled trephine.

The writer having occasion to perform an operation which would remove the pain which was present in all the branches of this third division of the fifth in a patient of 70 years of age, who had already undergone a previous operation on the inferior dental cut by trephining the lower jaw, and who was rapidly losing all self control from the pain; proposes the following operation, both for the rapidity with which it may be done, which is of much consequence in the aged, as was well shown in this patient, in whom the symptoms of collapse
were more marked after the first and lesser operation, which was however allowed to be
protracted to nearly an hour; then in the
second operation of 40 minutes.
The operation is as follows. An incision
commencing just below the lower border of the
malar bone, about 1/3 of an inch in front of its
articulation with the zygoma is carried in a shallow
horse shoe curve reaching about 3/4 of an inch
at its highest point above the zygoma, into
the temporal region, and then curving
downwards ends about 1/2 of an inch
below the zygoma just in front of the
articulation of the lower jaw. The skin
flap is then separated to the level of the
upper border of malar & zygoma which are
then sawn. Skin flap, bone & masseter all
of which are still united in their relative
positions are turned down. The Coroix's
process is next sawn off with the Temporal
muscle attached, the cut being sloped
so as to include all or nearly all the
attachment of this muscle, which is
then turned upwards. With a periosteal
elevator the upper fibres of the external
plexus are separated from the Sphenoid
and the periosteum separated from the
base of the skull inwards till the fora...
Oval is reached. The foramen was found with great readiness and the bleeding was almost absent. Ligatures of silk were passed under the nerve with a long handled hooked needle and tied the nerve being divided between them. That a rapid recovery was the case may be judged by the fact that on the third day the patient was found out of bed during the room.

Great facility seems to be gained by passing inwards beneath the periosteum which protects by its interposition between the structures likely to be damaged and the sphere of the operation in this region.

The cure in the above case has so far been permanent, (1½ years). Little disfigurement or displacement occurred from the operation.

Quoting from Brocken (Vol. 2 Science and Surgery, page 32-33) William Row is first credited with the removal of the Gasserian Ganglion, by trephining at the foramen ovale, which may be reached as already described. It seems however but not to remove the Ganglion entirely, as the Carotid sinus seems certain to get torn. Six cases out of 40 seem to have been fatal, and to divide the nerve by adhesion from the forns proved fatal under Victor Horsley.
Enckem (Semeiot, Art & Surgery Vol. II page 38) writes regarding the very painful neuralgia seen in the lower jaw, especially women who have lost many teeth, in the lower jaw usually. The cause ascribed being the contracted alveoli and indurated gum covering them. Removal of part of the indurated gum & alveolar border or destruction of the inferior dental nerve by cautery or otherwise seems a rational and successful treatment.

Finis.