PERSISTENT PAIN IN LESIONS OF THE
PERIPHERAL AND CENTRAL
NERVOUS SYSTEM.*

BY

WILFRED HARRIS, M.D.CANTAB., F.R.C.P.,

PHYSICIAN FOR NERVOUS DISEASES, ST. MARY'S HOSPITAL, AND TO THE
HOSPITAL FOR EPILEPSY AND PARALYSIS, MAIDA VALE.

PERSISTENT pain, which may be defined as acute bodily discomfort, varying in degree from a sensation of soreness or aching to one of intense and intolerable agony of torment, may be due to a variety of diseases affecting primarily other structures and tissues than the nervous system. Thus carcinoma naturally occurs to us, or other malignant growth, as a probable cause of any deep-seated pain, persistent in character, and lasting for weeks and months, more especially if accompanied by progressive emaciation.

The appreciation of any sensation of pain due to visceral or bone disease necessarily involves the agency of the nervous system in the transference of the sensory impulses from periphery to thalamus and cerebral cortex, but I am limiting my remarks as far as possible to diseases involving the nervous system itself, and shall omit discussion of the referred pains of visceral disease, such as dental neuralgias, errors of refraction, angina, the colics, sinus suppuration, abscesses, acute inflammations, and the like.

For the sake of convenience I have in the following classification arranged the causes of persistent pain in diseases of the nervous system in five classes progressing from periphery to centre, or from nerve ending to cerebral cortex.

*Causes of Persistent Pain in Diseases affecting the
Peripheral or Central Nervous System.*

1. *Peripheral* due to inclusion of nerve-endings in scar.
 - (a) For example, neuro-fibrositis, traumatic or rheumatic; adiposis dolorosa.
 - (b) Due to septic or to rheumatic terminal trigeminal neuritis:
 - (1) Chronic paroxysmal trigeminal neuralgia (Fothergill's disease, tic douloureux).
 - (2) Chronic neuralgia of upper or lower jaw.
 - (c) Geniculate neuralgia.
 - (d) Glossopharyngeal neuralgia.
2. *Disease involving Nerve Trunks.*
 - (a) Supraorbital neuralgia.
 - (b) Multiple neuritis.
 - (c) Brachial or sciatic perineuritis.
 - (d) Tumours or gummatous neuritis:
 - (1) Trigeminal.
 - (2) Spinal—for example, neurofibromatosis.
 - (e) Causalgia.
 - (f) Cervical or first rib pressure.
3. *Lesions of Posterior Root Ganglia or Posterior Roots.*
 - (a) Post-herpetic neuralgia:
 - (1) Trigeminal.
 - (2) Spinal.
 - (b) Tabetic neuralgia.
 - (c) Other root scleroses.
4. *Central Sclerosis of Fillet or Thalamus.*
 - Intra-medullary growths.
 - Syringomyelia and syringobulbia.
5. *Psychalgias.*

Neurofibrositis.—The pains of chronic or acute fibrositis of the lumbar or dorsal region, often known as lumbago and muscular rheumatism, are doubtless only too well known to many of us, though common as the affection is its pathology is largely a matter of conjecture. Violent and especially sudden muscular action is the exciting cause in a considerable number of cases, the sudden onset of intense pain immediately after a heavy muscular strain, such as a slip or fall when carrying a heavy weight, the pain relieved by lying down or sitting in a deep chair and aggravated immediately on movement, suggest rupture of muscle or tendinous fibres involving sensory nerve filaments as the cause. In the majority the pain disappears after a few days or weeks, while occasionally the disorder persists for years.

Recently I was consulted by a farmer, a powerfully built muscular man, who some ten years ago slipped and fell when carrying a sack of wheat weighing about 260 lb. He was

immediately seized with acute pain across the lumbar region, and more especially in the neighbourhood of the right posterior iliac spine. He has been subject to this pain ever since off and on, worse on movement or during heavy lifting, and now and again he is subject to exacerbations so severe he can scarcely move or dress himself. When I saw him during such an attack his spine was flexed laterally towards the right, and there was a small circumscribed area of great tenderness on deep pressure over the right posterior iliac spine. Careful marking of the site of chief tenderness, followed by injection of a few minims of 90 per cent. alcohol deep into the tender area, completely relieved his pain within fifteen or twenty seconds, so that he was able to stand up straight, the lateral flexion of the spine having now disappeared and he walked away in comfort.

Acupuncture has long been recommended since Sydney Ringer's time for similar conditions, but if one or more definite areas of tenderness on deep pressure are discovered, I consider that alcohol puncture is far more valuable.

Traumatic neurofibrositis may involve larger nerve trunks, not nerve filaments only, and sciatic perineuritis is a fairly common early sequel to fibrositis of the lumbar region, whether this is of rheumatic origin or due to a fall or other injury. Here again the pain may continue for months, or even years. Sciatic perineuritis as a sequel of muscle strain or fall is particularly amenable to treatment by massive saline injections into the nerve just below the notch, the probable site of the nerve sheath damage. Alcohol injection of the sciatic must of course never be attempted, owing to the certain result of paralysis of the foot which would ensue, but saline injection of 50 or 60 c.cm., preceded by 2 c.cm. of 2 per cent. novocain into the nerve often cures the sciatica immediately. This treatment, though often valuable, is less certainly successful in the rheumatic sciaticas, possibly owing to the large area of the nerve which may be the seat of trouble. In both the rheumatic and the traumatic sciaticas, there are frequently spots of deep tenderness with aching pain either in the neighbourhood of the trochanter or between the notch and the iliac crest, which may keep up the discomfort and pain after the actual sciatica has been relieved. These are probably local areas of neurofibrositis in the glutei or erector spinae, and may be mostly successfully injected deeply with alcohol, after the nerve itself has been treated with saline injections. The saline injections may relieve by breaking apart laterally adhesions of the nerve sheath, as the sciatic nerve is a loosely built nerve and readily takes the fluid, swelling up like an egg at the site of injection (as may be seen by injecting the nerve after exposing it on the *post-mortem* table).

Paralysis of the sciatic I have never seen as a result of violent muscular action, but in the region of the brachial plexus local paralysis from involvement of the posterior scapular, long thoracic, or circumflex nerves may occur. As with sciatica, so *brachial perineuritis* may occur from muscular overstrain, or rheumatism and other toxic causes, such as pyorrhoea. Usually the posterior cord and musculo-spiral nerves suffer most. As in the lumbar region, so also in the neighbourhood of the scapula, and sometimes in the forearm, areas of deep tenderness may be the sole cause of chronic wearing pain, or may accompany a more extensive brachial neuritis. Alcohol puncture of such tender spots often has most brilliant results, chronic pain that may have persisted for many months or years being relieved instantaneously. The spots must be carefully located and marked, and a fine needle—hypodermic size is usually long enough—plunged vertically into the spot down to the level of the rib or scapula. Care must, of course, be taken that the needle does not pass between the ribs and pierce the pleura.

Bruising of the scalp by an injury to the vertex from a blow against the lintel of a door or fall of a heavy weight is sometimes followed by persistent headache, varying in intensity, or periodic and associated with a local area of tenderness on pressure. These cases also may be relieved by the same treatment. This form of headache must be distinguished from migrainous neuralgia, in which the periodic headache is unilateral, and often associated with intense pain and tenderness on pressure on one temple. Alcohol injection in these cases is quite useless, as is only to be expected, the origin of the pain being probably central and not peripheral.

Chronic paroxysmal trigeminal neuralgia is certainly of peripheral origin, and is probably due to septic neuritis of nerve filaments in the maxilla or mandible. Scarcely

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ever does this disease affect the upper division and supra-orbital alone, but it may be involved along with the second division.

John Fothergill's original description, nearly a hundred and fifty years ago, of the painful attacks is scarcely to be improved on to-day, though his view of its pathology, thinking that it must be cancerous because of the long-standing pain, is now discarded. Many causes appear to contribute to its appearance. Heredity of the disease I have met with in about 1 per cent. of my cases. Strong emotion may precipitate an attack. Injury and blows on the jaw are a not infrequent cause, as may also be exposure to severe chill, as in motoring or driving; a septic antrum has preceded typical tic douloureux of the second division too often to be a coincidence. I find the disease twice as frequent in women as in men, a point also noted by Fothergill, though he saw only sixteen cases in his practice—or business, as he calls it. A curious point my statistics show is that the disease is twice as frequent on the right side as the left, and commoner in the upper than the lower jaw, though both are often affected. The larger incidence on the right side may be due to better use of the toothbrush on the left side of the mouth, as would be natural in right-handed people, according to Mr. Warwick James. Bilateral trigeminal neuralgia is comparatively rare. I have met with it perhaps thirty times only among several hundreds of cases. The disease rarely disappears spontaneously when established; I have known this occur only once, in the father of a sufferer from this disease, who was my patient. Her father suffered for twenty-five years until he was 90, but was free for the last fifteen years of his life, living to 105. In the early stages, however, long periods of remission may occur; I have known thirty years elapse between the first and second attacks, and intervals of one or two years are common. Sometimes a certain periodicity is seen, as for a few weeks to three months every autumn or winter. As the years pass usually the intervals of freedom get shorter. In a few there is practically no remission, agonizing pain inevitably following every movement of the face, as in eating or in washing. One of my patients, a lady, had been unable to wash the right side of her face for twenty years.

Often the lightest touch of a hair or draught of air will start a paroxysm, though at other times nothing may provoke the pain. During the painful bouts the prick of a pin usually seems more acute on the affected side, though this is a temporary hyperaesthesia only, and is not present between the attacks.

Fothergill, 150 years ago, thought hemlock pushed to toxic doses was a cure for this complaint, but our experience nowadays is that drugs comparatively rarely are of service, and that real relief is obtained only by a solution of continuity of the offending nerve trunk. Practically the choice, in severe cases of pain, is between gasserectomy or division of its sensory root, both severe operations, on the one hand, and alcohol injection of the nerve trunks at their deep foramina, or injection of the ganglion itself. For bilateral cases of this neuralgia the gasserectomy operation is not permissible, owing to the jaw drop that would ensue, though bilateral destruction of the ganglion by injection may be done, as the motor root then recovers, though the sensory ganglion cells are permanently destroyed. A curious point I have often noticed when injecting the foramen ovale and ganglion is that the ophthalmic or inner portion of the ganglion goes totally anaesthetic before the second division, and it may be extremely difficult at times to get total anaesthesia of the cheek when the forehead and eyeball remain permanently anaesthetic. I have no satisfactory reason to account for this.

Another puzzle that occasionally arises, though fortunately it is rare, is the partial recurrence of sensation on the chin and remainder of the third division, when the first and second divisions remain totally anaesthetic. With this reappearance of sensibility pain may return, and that this is not necessarily the result of faulty injection is proved by the fact that gasserectomy and division of the sensory root behind the ganglion may not alter the conditions. One is tempted then to call the persistent pain a psychalgia, but that this is so I am not convinced, as there is no doubt true sensation on the lower lip and chin. Gasserectomies, of course, like other operations, may sometimes fail through being incomplete; I have seen several

such cases where pain has returned after about ten years, with reappearance of cutaneous sensibility, yet I do not think that is the explanation in the few cases above referred to, though no such case that I am aware of has come to autopsy.

Another form of *persistent trigeminal pain* that I have seen many instances of is, in my experience, peculiar to young women. It is continuous, not paroxysmal, though it may vary in severity, and it affects either the upper or the lower jaw. It is not provoked by eating, laughing, washing, or other movements of the face, as is true tic douloureux. It is more difficult to relieve by alcohol injection than spasmodic tic douloureux, inasmuch as total anaesthesia is necessary to abolish the pain, and with commencing regeneration of the nerve the pain recurs. In tic douloureux, however, in a large majority a medium anaesthesia from injection may be sufficient to abolish the pain, in some cases for many years; in one of my early cases there has been no recurrence twelve and a half years after injection of the foramen ovale, though only light anaesthesia now remains. This lady had previously suffered from typical tic for twenty years, section of the inferior dental nerve having given only two years' relief. In her case the neuralgia commenced at 17, and I have seen it commence at 17 in two other cases, and once at 16, many in the twenties, but most commonly about the age of 50.

On the other hand, the type of persistent neuralgia of upper or lower jaw previously described I have met with only in women of 15 to 35. Its cause I am very uncertain about, unless it is a chronic osteitis of the jaw. Its limitation to women I do not understand, as the sufferers I have met with have not been notably of neurotic type. Moreover, the true tic douloureux is undoubtedly much more frequent in women than in men—about two to one. These cases are more difficult to treat than true trigeminal neuralgia, as nothing short of total nerve destruction cures the pain.

Geniculate neuralgia, or neuralgia affecting the distribution of the sensory fibres contained in the seventh nerve, has been fully described by Ramsay Hunt and others, though some deny the association of the seventh nerve with such neuralgias. Transient pain around and behind the ear, lasting for two or three days, is a commonplace in association with the onset of facial palsy, and often precedes the motor paresis. Much rarer are instances of true herpes zoster affecting the auricle in association with facial palsy. The distribution of the herpetic rash is usually on the concha and antihelix, though it may be found behind the ear where the pinna joins the scalp, and also along the posterior wall of the exterior auditory meatus. Such a distribution of herpes I saw once in a medical man, without facial palsy, who for many weeks afterwards had excruciating paroxysmal neuralgia affecting the ear, front of the ear, and back of the lower jaw and neck. Pierce Clark and Taylor of America describe a case of chronic tic douloureux affecting this area which was cured by operation by trephining and dividing the pars intermedia. Wrisberg, or sensory root of the seventh nerve, intracranially.

Glossopharyngeal Neuralgia.—A rare form of chronic paroxysmal neuralgia or tic douloureux may affect the glossopharyngeal nerve. In its paroxysmal suddenness of onset, and in the severity of pain, glossopharyngeal tic is identical with trigeminal tic, for which it may easily be mistaken. Distinguishing it, however, from the latter, the pain in glossopharyngeal tic starts in the throat, in the region of the tonsil and anterior pillar of the fauces. The pain radiates to the ear, and especially just in front of the ear, along the back of the mandible, and into the upper part of the neck. I have met with two only of these cases, both of which had lasted over ten years, one a man aged 40, the other an old lady of 87. As in trigeminal tic, the first onset of the pain may be furious and sudden, in the man's case the pain striking him in the throat as he opened his mouth to eat a sandwich. When I met with these cases, now ten years ago, I knew of no reference to glossopharyngeal neuralgia, and in case the pain might be an unusual form of trigeminal neuralgia I injected the third division at the foramen ovale in each case, quite successfully as regards destroying this branch, but without influencing the recurrent neuralgia. I have since seen somewhat similar spasmodic pain, with intense hyperaesthesia of the side of the neck, in a case of recurrent

epithelioma in the tonsil, following seven years after extirpation of a vocal cord for malignant growth. It was this case which convinced me of the identity of glossopharyngeal tic in the two previous cases referred to, and I have lately seen a description by Sicard in France of three cases met with during the war of glossopharyngeal neuralgia, which were cured by surgical help in division of the nerve in the neck.

Diseases Affecting Nerve Trunks.

Supraorbital Neuralgia.—Persistently recurrent supraorbital neuralgia is met with in both sexes, though oftener in women. I assume that migrainous and true trigeminal neuralgia, and the peripheral causes, such as errors of refraction, frontal sinusitis, frontal herpes, antral abscess, and dental neuralgias, have been excluded. Sometimes paroxysmal supraorbital neuralgia occurs daily, coming on about the same time, perhaps 10 or 11 a.m., and lasting until 5 p.m. I have seen this type follow influenza several times. Usually the pain is limited to the supraorbital nerve, but it may involve the whole of the ophthalmic branch.

In a recent case, a woman of 47, pain began four years ago, lasting for eight hours daily from January to June. Next year and the year after a similar repetition occurred. A year ago she had a more severe attack, and since then has had pain daily from 12 noon to 5 p.m., never a day free. The pain is situated in the forehead and left side of head as far back as the coronal suture, and extends along the left side of the ridge of the nose. Unlike trigeminal neuralgia, the pain is not evoked by talking, eating, or other movements of the face, or by rubbing. Supraorbital injection gave little or no relief, though deep anaesthesia was produced. Injection of the Gasserian ganglion was then done, the anaesthesia of the first division being total for an hour or more, but subsequently wore off partially. The neuralgia disappeared completely for several days, and then reappeared in a much attenuated form. Very probably total destruction of the ganglion would have produced a complete cure of the neuralgia.

Perhaps the majority of paroxysmal supraorbital neuralgias are migrainous in type, for which alcohol injection is of little or no use. In some subjects this migrainous periodic neuralgia is limited to the temple.

Only comparatively rarely does true trigeminal neuralgia invade the first division of the fifth nerve—that is to say, a paroxysmal neuralgia, sudden and intense, and brought on by movements of the face, rubbing of the skin, or even a draught. In only one instance have I seen it remain limited to the first division of the fifth nerve for years without either the second or third division becoming involved, and even in this case rubbing the chin would start the pain in the forehead. Practically always the neuralgia also involves the second, or even all three divisions, when the supraorbital distribution is involved, though it is to be remembered that the pain in the second division of the fifth frequently, indeed generally, extends above the eyebrow and in front of the temple. In all cases of persistent or recurrent pain anaesthesia must be looked for. If it is present in trigeminal cases then either syphilitic neuritis, gumma, or tumour is the cause.

Chronic pain in the distribution of the trigeminal nerve may be due to tumours or gummata involving the sensory root of the fifth nerve within the skull or one or more of its branches externally. Tumours in the ponto-cerebellar angle may irritate the sensory root of the fifth and simulate trigeminal neuralgia for years. The pain, however, though variable, is less spasmodic and not brought on by light touches or movements of the face. The main point in distinguishing lesions of the trunk or main branches from trigeminal neuralgia is the appearance of diminished sensibility in the affected area. Motor palsy of the muscles of mastication also may be present. When these signs of gross damage to the fifth nerve are found trigeminal neuralgia may confidently be excluded, unless neurectomy or alcohol injection has previously been done. Peculiarly distressing cases to deal with are the nasopharyngeal growths, causing persistent pain and increasing anaesthesia of either the second or third divisions of the fifth. When the growth invades the zygomatic fossa and involves the third division deafness of that ear is usually produced by involvement of the Eustachian tube. When the growth is more central and invades the pheno-maxillary fossa, besides involving the second division of the fifth, there is produced presently diplopia, and later proptosis and fixation of the eyeball, through extension into the back of the orbit. Beyond anodyne remedies I know nothing that

relieves these cases. Operation seems useless; the growth is never circumscribed and always recurs. In *malignant growths of the maxilla* pain may be exceedingly troublesome, even after excision, due to recurrent growth. This pain may be completely relieved by a successful alcohol injection of the Gasserian ganglion. Similarly the agonizing pain due to *carcinoma of the side of the tongue* and lower jaw may be completely arrested by alcohol injection of the third division of the fifth nerve at the foramen ovale.

Persistent trigeminal pain for weeks and months, non-spasmodic, and accompanied by diminished sensibility of that side of the face, but without the pressure signs above referred to of Eustachian deafness, proptosis, and diplopia, should suggest *gumma* as a probable cause. Even if the Wassermann reaction be negative it is well always to give antisyphilitic treatment a trial. I have met with several such cases of syphilitic trigeminal neuritis which cleared up completely under treatment by biniodide of mercury or salvarsan injections.

Rib Pressure on Brachial Plexus.

Chronic pain in the arm and neck, running down to the inside of the hand, in women between 20 and 30, will usually suggest cervical rib as a cause, through pressure on the first dorsal nerve as it rises to join the inner cord. Wasting of the musculature in the hand and diminished sensibility along the inner border of the forearm to the wrist renders the diagnosis more certain. If a skiagram demonstrates a cervical rib, the position is clear. Many cases of rib pressure due to the first rib alone, in the absence of a cervical rib, have been recorded; I have had two such cases successfully relieved by operation within the last six months. In one of them the first rib caused a prominent hard swelling above the clavicle, which it was difficult to believe was not a cervical rib when the skiagram proved the absence of the latter. The diagnosis is therefore more complicated and difficult now that we must realize that with symptoms suggestive of cervical rib the skiagram may be normal.

Causalgia.

During the war the frequency of cases of persistent agonizing pain due to injuries of nerves, often slight, was most remarkable. The large majority of these cases involved the median or internal popliteal nerves, though I have seen it also in the distribution of the ulnar, long saphenous, external cutaneous of the thigh, and radial nerves.

In some cases the nerve injury was so slight that no demonstrable anaesthesia was present, only an intense hyperaesthesia, varying at times, and liable to be aroused into an intense spasm of pain by a sudden emotion, noise, or vibration, or light touch, thereby reminding us somewhat of the onset of the paroxysms in trigeminal neuralgia. The pain is described as of a burning heat, hence the name *causalgia* (καίω, I burn), and bursting sensations in the fingers were common. The pain in many cases lasted for weeks and months, and in some it was necessary to produce nerve blocking in order to arrest the pain, by alcohol injection of the trunk of the nerve above the injury. Common enough during the war, I have seen only one such case in civil life, where a man tore his thenar eminence in some cogwheels two years previously. The pain was limited to the ball of the thumb, and immediate and complete relief was obtained by injecting the median nerve with alcohol just above the wrist. The nerve can be easily found here as it lies between the tendons of the flexor carpi radialis and palmaris longus, and pricked with a hypodermic needle and injected. No open operation is necessary for this.

Painful stump was another very common sequel of amputation in the war.

Brachial and Sciatic Perineuritis.

Sciatica I have already referred to, especially in association with lumbo-sacral fibrositis, either of a rheumatic, septic, or traumatic origin.

A very chronic and obstinate type of sciatica I would like to refer to here, in which the most noticeable sign on examination is *scoliosis*, a lateral flexion of the spine away from the painful side causing the hip on the affected side to stick out. The lower cervical spine may be as much as 5 inches to one side of the vertical median line when

standing. This scoliosis disappears on sitting or lying. It is a result of a local lumbar fibrositis in the erector spinae in the region of the fourth and fifth lumbar transverse processes. Occasionally a definite area of deep tenderness can be localized, and it is sometimes possible to procure an immediate and dramatic relief by alcohol puncture of the spot. Short of that treatment these cases are very chronic and resistant to ordinary treatment, and three months' rest in bed may be necessary to effect a cure.

Brachial neuritis is seldom so chronic as some of the sciaticas, though the acute form is probably more painful, due, I think, to the structure of the cords of the brachial plexus being denser and firmer than the sciatic, and thus admitting of less swelling in inflammation of the sheath. This point is easily demonstrated in the dead body by cutting down on the sciatic and brachial nerve trunks and injecting fluid through a hypodermic needle. The sciatic takes it easily and swells up in an egg shape, but it is difficult to force more than a few drops into the main brachial trunks.

Chronic pain about the scapula and arm may be due to cervical rib or to neurofibrositis, as already stated. A common cause of pain referred from the shoulder down the arm, perhaps to the elbow, its maximum usually about the insertion of the deltoid, is *adhesions in the shoulder-joint*, the result of some slight injury, such as straphanging, being jerked by getting on or off a bus or tram, or by a slight fall.

These cases are frequently diagnosed as neuritis. The pain starts usually a day or two after the injury, and is due to a synovitis, the subsequent adhesions causing pain with every movement or pressure on the joint. Wrenching under gas, with subsequent passive movements and massage, usually effects a cure, but some cases are too painful to tolerate the after-treatment and partial fixation is permanent. To be distinguished from this condition is the fixation of the shoulder from adhesions subsequent to immobilization during the acute stage of brachial neuritis. The history of severe pains and pins-and-needles down to the fingers generally makes this point clear, but the treatment by massage, passive movements, or even wrenching under gas is the same.

Disease of Posterior Spinal Roots or Root Ganglion.

Post-herpetic neuralgia is one of the most inveterate and difficult neuralgias we have to treat. Due in part to an inflammatory lesion in the root ganglion, in some cases to a neuritis of the nerve trunk, and in others even to inflammatory changes in the grey matter of the posterior horn in the spinal cord, the pain is constant and wearing, causing great depression. Rare under the age of 50, chronic neuralgia following an attack of shingles is increasingly common in older people. In some the pain may persist for months and then gradually disappear, but in others it may remain for years, and has led to suicide. With the pain is usually a severe numbness and sense of constriction, and the area of scarring is usually partially anaesthetic. Beyond local anodynes and mild tonic treatment, I hesitate to suggest more active measures. Alcohol injection in spinal cases is, I believe, quite useless, and division of posterior roots after laminectomy is, I believe, not always successful. I should be glad to hear experiences of surgeons on this point.

Herpes of the trigeminal area is mostly limited to the ophthalmic division, often called *frontal herpes*. A common sequel is numbness, sensation of constriction and paraesthesiae, or formication, not really amounting to pain. Occasionally, however, in old people subsequent neuralgia in the anaesthetic area is very distressing and persistent. For this, alcohol injection of the Gasserian ganglion may give complete relief, and I have done this in three such cases, but it is necessary to produce total and lasting anaesthesia equal to that resulting from a gasserectomy.

Chronic pain in the limbs, usually the lower limbs, may result from posterior root sclerosis, subsequent to meningitic lesions. *Haemorrhachis*, or intraspinal haemorrhage in the lumbo-sacral region, may result from heavy muscular effort. The effused blood is apt to clot around the roots of the cauda equina and cause chronic irritation and pain in one or both lower extremities, with wasting and loss of reflexes, and possibly diminished sensibility. Lumbar

puncture will clear up the diagnosis, a straw-coloured cerebro-spinal fluid being drawn off even a year or more after the onset. In one such case I had laminectomy performed, and a large purple clot 4 in. long surrounding the roots of the cauda equina removed, eighteen months after the injury.

Tabetic pains are too well known to need enlarging on here. Their treatment is perhaps less satisfactory. Mercurial friction improves some, intravenous salvarsan yet others, while for those who do not notably improve under salvarsan only I have seen considerable numbers benefit immensely as regards severity of pain by intraspinal injections of the serum taken from the patient's blood after intravenous salvarsan. Usually there is a strong reaction about two hours after the injection of 50 to 55 c.cm. of the serum, severe pains in the limbs coming on and lasting twelve to twenty hours, followed by more or less complete relief, which may last for years. Presumably the injection of the serum sets up some congestive reaction in the posterior nerve roots which acts beneficially on the chronic syphilitic neuritis which is the source of the pain. Root sclerosis may be due to other causes, such as haemorrhage, toxic degeneration in diabetes, and other causes of neuritis.

Intramedullary Lesions.

Proceeding centrally, we find chronic neuralgic pain resulting from intramedullary lesions affecting the fillet and thalamus. Usually the pain is constant, burning and pins-and-needles in character, but occasionally it is paroxysmal and neuralgic.

More than ten years ago I showed before the Neurological Section a man of over 60 who had suffered from an attack of thrombosis of one posterior inferior cerebellar artery. As a result of the thrombosis, implicating the side of the medulla with the fillet and the descending or spinal root of the fifth nerve, there was analgesia of the left fifth nerve area and of the right half of the body excluding the face and the forehead. In the analgesic area of the left fifth he complained of constant neuralgic pain, which nothing appeared to relieve. It is, perhaps, difficult to understand how a simple sclerotic lesion can cause persistent neuralgia in the absence of any irritating focus, and this is the only instance of this posterior inferior cerebellar syndrome which I have seen with permanent neuralgia resulting, though this particular thrombosis does not appear to be very rare, as I have met with twenty or more cases.

It has been suggested that the persistent burning pain and paraesthesiae in lesions of the thalamus or fillet is due to the spontaneous unrestrained activity of these nuclear centres for sensation. Similar pain is met with in some cases of syringomyelia and syringobulbia, the pain being referred to analgesic areas, an analgesia dolorosa. Intramedullary spinal tumours also are liable to cause a burning pain as an early symptom, which may precede for many months any more definite localizing signs.

Psychalgia.

Pain of mental origin is usually distinctive in character, such as the vertical pressure pain or clavus hystericus of some neurasthenic headaches. A mental neuralgia may usually be distinguished from a true neuralgia of peripheral origin by its distribution not being anatomical in form and overlapping other nerve areas, and especially in crossing the middle line.

A parson, aged 63, for two and a half years has had pain in the right great toe. Of three surgeons who saw him, one operated for exostosis, the second excised the joint, the third told him he had a kink in his colon, but let him off with an abdominal belt and paraffin internally, and advised him to get a tendon cut. In spite of all treatment—or because of it—his pain is now much worse. On inquiring into his history, I found he was the child of first cousins, and that insanity was very prevalent in his family. As I could see nothing wrong with his foot or leg, I have little doubt that this pain was an instance of psychalgia.

With the psychalgias may, perhaps, be included many of the *coccygodyniae*, though perhaps in the majority of them there is a history of some local injury at the outset.

Occasionally there may be difficulty in diagnosis, as in the following case:

This was a Jewish patient whom I saw for pain on the left side of the cheek and forehead and nose, but crossing the nose as far as the inner canthus of the opposite eye. He was anxious for injection treatment, and as he had had much medicinal treatment without benefit, somewhat against my better judgement I injected the second division of his fifth nerve. Although dense anaesthesia resulted, the pain was not improved, being

indeed rather worse. I then hesitated between advising suggestion treatment and injection of the Gasserian ganglion. He would not have the former, and, again against my better judgement, I injected him, this time through the foramen ovale, producing total and permanent fifth nerve anaesthesia. His eye and cornea fortunately gave no trouble, but he was now even more complaining of the pain, and he therefore went to see a surgeon regarding gasserectomy, who, however, refused to do the operation when he found the fifth nerve area totally anaesthetic. Baulked in this, he went to yet another surgeon, who operated to remove his ganglion; but the last I heard of him was that he was complaining even more of pain.

The moral of this tale is that it is unwise to attempt any form of surgical treatment for psychalgias, the pain is apt to get worse, or spread to another area, and once an operation has been performed, it is most difficult for another practitioner to sift the real from the false and to make a diagnosis.

A CASE OF PYOCELE OF THE FRONTAL SINUS.

BY

J. A. GIBB, M.B., M.Ch.,

HONORARY SURGEON, KENT COUNTY HOSPITAL FOR DISEASES OF
EYE, EAR, NOSE, AND THROAT, MAIDSTONE.

On May 18th, 1921, I was asked by Mr. Potts, ophthalmic surgeon to this hospital, to examine a patient, a married woman, aged 57, for frontal sinusitis. She had a slight swelling at the inner canthus of the left eye, and complained of some "pricking in the left eye," but not of headache or any other subjective symptom.

The swelling was firm and could not be pressed away. Intranasal examination showed no discharge on either side; the mucous membrane was quite normal in appearance and there was no enlargement of the turbinate bones. The post-nasal space was also quite clear of any discharge. Transillumination showed both frontal sinuses clear and of about normal size; the maxillary antrum was also clear; there was no history of a blow. My report was that the frontal ethmoid and maxillary sinuses were unaffected.

Three months after this the patient was admitted into hospital with a compressible swelling on the left frontal sinus. The house-surgeon, Mr. Reed Hill, needled it and got pus. There were no subjective symptoms such as headache, etc.; the temperature was negligible. The eyeball was pushed downwards and outwards, with swelling of the soft tissues of the upper eyelid and inner angle of the orbit.

Operation.

I operated as soon as the patient could be got ready, making an incision along the eyebrow; there was an immediate gush of odourless reddish muco-pus. A gloved finger was inserted into the cavity, which was felt to be unusually large. I therefore made a further incision at right angles to the original at its inner angle, going well up the forehead; the flap was turned upwards, the cavity swabbed dry, and all bleeding arrested.

It was then made clear that the anterior wall of the frontal sinus, with the exception of a thin pliable piece of bone adherent to the flap, was absorbed. The floor (except for a small plate of bone over the orbit), the posterior wall, and the septum between the two sinuses were also absorbed, so that the right frontal sinus could easily be explored. Portions of dura mater were missing, and brain substance, looking red and inflamed, was exposed. A probe could be passed on either side into the nose; the posterior ethmoid cells were absorbed. The fronto-nasal duct could not be made out, and the probe could be passed down to the loop of the post-nasal space, the mucoperiosteum everywhere being intact, except where the orbital plate had been absorbed; here the probe passed into the cheek. The sagittal sinus was intact, but the whole of the left frontal lobe of the brain was completely exposed and, if it had been desirable, could have been raised and its under surface explored. The wound was sutured with the exception of its outer and inner angles, which were drained.

Recovery was gradual, and the temperature and pulse negligible throughout until, at the end of three weeks, a pocket of pus, quite different from the original infection, formed under the scalp at the inner angle of the original incision and extended down to the cheek. This was opened, gently scraped, and swabbed out with hypochlorite solution. The patient is now quite well.

I deemed it unnecessary and inadvisable to open up any communication with the nasal cavities, as I felt that the cavity would in all probability become filled with fibrous tissue.

The case was shown at the local Branch of the British Medical Association, and I expressed the opinion then that the condition was a mucocele of the frontal sinus which

had become infected. The recent Hunterian Lecture by Mr. Howarth, published in the *Lancet* of October 8th, has impressed me with the fact that the condition is not as uncommon as I at first deemed it to be; nevertheless the publication of this case may be of some interest.

The following details of the eye condition, as recorded by Mr. Potts, were supplied to me by Mr. Reed Hill:

The patient attended hospital on May 14th, complaining of slight discomfort behind the left eye. On examination, R. vision = 6/6, L. vision = 6/12, no hypermetropia; a small swelling was felt below the left supraorbital notch; some slight proptosis was present, and displacement of eye downwards and outwards, but no diplopia. Examination of the fundus revealed no pathological changes.

On re-examination four months later, the eye was observed to have returned practically to its normal position. The proptosis had disappeared, and there was very slight displacement of the eye downwards, the level of the left pupil being about two millimetres below that of the right. Fundus, optic disc and media were quite normal. It was found that the patient had an error of refraction which when corrected gave R.V. ± 1.25 D cyl. axis vert. = 6/6; L.V. ± 1.25 D cyl. axis $\angle 70^\circ = 6/9$. On testing for heterophoria the left image was found to be situated above and to the right of the right image, but they were approximately fused by a 12 Δ prism base upwards and inwards.

The extrinsic muscles appeared not to have been affected, as there was no limitation of movement of the eye. The fields showed no contraction, nor were there any scotomata to be made out with either white or colours.

SUTURE OF SEVERED MEDIAN NERVE, WITH RAPID RECOVERY OF FUNCTION.

BY

EDGAR WIRTH, M.D. MALTA,

ESSEX COUNTY HOSPITAL.

A boy, aged 14, on May 28th, 1921, thrust his arm through a window pane, severing the internal and part of the external belly of the biceps and coraco-brachialis muscles, the brachial artery and vein, and the internal cutaneous and median nerves. First aid was luckily at hand, a tourniquet was applied and the boy sent to the hospital.

Examination of function revealed complete loss of power in all the muscles, and loss of epicritic, protopathic and deep sensibility in the area supplied by the median nerve. The latter was severed *en bec de flûte* without irregular tags.

I ligatured the brachial artery and vein and freed the median nerve at the proximal and distal ends. By means of a fine suture of chromicized catgut exact adaptation of the ends was aimed at, with the view of bringing each proximal fibre in contact with its own distal fibre, as far as could be expected. This was obtained by rotating the ends of the divided nerve on their axes. A zigzag suture of catgut was then introduced all round the nerve, taking into each stitch-loop only the sheath, and no nerve tissue, and in such a manner that all the longitudinal threads lay on the outer surface of the nerve like a tube. For this purpose the sheath was transfixed twice at each bend of the gut, in a transverse direction, thereby minimizing the danger of cutting through.

Through the retraction of the sheath, which ensues in such cases, the protruding nerve fibres tended to slip out from between the bars of this cylindrical fence of catgut, and had to be pushed back with a probe. I did not find this method of suturing difficult, nor did it take much time. I believe that the non-inclusion of nerve tissue in the stitch and in the complete retention of the prolapsing fibres by numerous threads of catgut all round, which at the same time secured accurate adaptability of the ends, may have a lot to do with the rapid restoration of function.

A glove drain was left in the depth of the wound, the arm put up in a flexed position and at complete rest on a pillow. Healing was uneventful.

Two days after the operation I was surprised to find that the patient showed distinct improvement in some of the movements controlled by the median nerve, as, for instance, better flexion at the wrist, much better pronation of the forearm, less impairment of opposition of the thumb, and less difficulty in abduction of the thumb. There was, however, still inability to flex the terminal phalanges of thumb and index finger.

At the end of six weeks there was almost complete return of normal muscle power, the grip remaining somewhat weak. Sensation showed little improvement. For