fication of a disease-producing microphyte is the faculty of living and multiplying in the living tissue, the researches of recent years have taught us that its poisonousness is even more essential than its adaptedness to a living nutritive medium; so much so that the damage which it thereby inflicts on its living environment is a means by which it modifies that environment for its own advantage. We have further seen that the contest which takes place in the organism between invading microphytes and the living elements of the invaded territory is not a hand fight between tissue elements and microphytes, but one in which both act (so to speak) at a certain distance, and in which the weapons are poisons and counter-poisons, toxins and anti-toxines—words which imply that the pathological endowments of these bodies are antagonistic.

The question of infection, therefore, has become—as many clear-sighted pathologists foresaw that it necessarily would—more and more chemical, less morphological. But in saying this, we must carefully guard against its being implied that any progress in the discovery of the chemical agencies by which diseases are produced and prevented can be made without the bacteriological method, or that it is in the least less necessary than before that all who intend to be pathologists should perfect themselves in the *technique* which Dr. Koch created. If, therefore, the questions which at this moment concern us appear to be chiefly chemical, it means only that we have got from the form to the substance, from the agent to the action. Pathologists were never phytologists, and are not now chemists. We care for microphytes not as botanical species, but as makers of toxins; and for toxins not as chemical compounds but as producers of disease. For although, as not being organised, we must call them chemical, our chemical knowledge respecting them is so inconsiderable, so vague, that the chemist would scarcely recognise their existence. They possess certain pathogenic or alexeteric properties which appear to attach themselves to proteids; but of their chemical nature, the pathologist is able to say even less than the physiologist can of the so-called enzymes.

I must not end without saying a word as to the future of pathology in this country, and particularly in this great metropolitan school of medicine. Unfortunately it must be admitted, whether we like it or not, that hitherto we have been too much contented to let other men labour and complacently to enter into their labours. I have in the course of these lectures been only too conscious, and it must have been equally apparent to those who have listened to me, that of the names I have had occasion to refer to as of men who have achieved the progress which it has been my business to record, few, far too few, have been names of our own countrymen. Happily the promise of the future is more encouraging than the record of the past. We have now, if not a host, a considerable body of men who know their business and how to do it—men young enough not to have lost those exact habits of observation acquired by previous studies in physics and chemistry, and in physiology, yet old enough to take a living interest in medicine—men with a very definite understanding of what pathology means and how it must be advanced, namely, by that same method which Harvey commended so emphatically to us over two hundred years ago—the searching out of the secrets of Nature by way of experiment.

In the part it has taken in the building and establishment of a laboratory for researches in pathology and pharmacology this College has given substantial proof of its readiness to follow Harvey's counsel. It could not have raised a better monument to his memory. The success of the laboratory is already assured. Small as it is, it has already become a centre of pathological work—a focus whence a salutary influence in the direction of real progress is spreading in every direction. Nor can it be doubted that when the advance of the next ten years has to be chronicled its establishment will be looked back to as the beginning of a new era.

By decree of the Prefect of the Seine, a Committee, which includes Professor Brouardel and Dr. Motet among its members, has been formed for the purpose of studying the questions connected with the creation of a medico-legal institute in Paris, and drawing up a scheme for its organisation.

REMARKS

ON

THE VARIOUS SURGICAL PROCEDURES DEvised FOR THE RELIEF OR CURE OF TRIGEMINAL NEURALGIA (TIC DOULOUREUX).

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NEURALGIA is a term of somewhat vague import, merely implying the existence of pain as a result of some morbid condition of the nerves. The special form of neuralgia with which this paper is concerned is what is known as facial or trigeminal neuralgia, the nerve affected in this case being the fifth or trigeminal. The pain may be situated in any part of its region of distribution, and may depend upon an affection of any branch of one of its three main divisions; but the pain present in this condition is peculiar in several respects. It is intense and paroxysmal, with frequent intervals of freedom, which may extend over days or hours, or may be limited to only a few seconds, so that it becomes practically continuous. It is often confined to a particular branch of one of the divisions, but it not uncommonly extends from one into another, and in an extreme case all three divisions of the nerve may be involved. But it usually starts at some particular spot, frequently corresponding with the exit of a nerve twig from a bony canal, and it may be excited by the least change in external conditions. A slight breath of wind or the lightest touch may evoke a paroxysm, and moderate pressure never fails to excite it. It is this paroxysmal character which has earned for it the synonym of epileptiform neuralgia or tic douloureux.

These tender spots or foci were first pointed out by Valleix, and they are as follows:—In the distribution of the first division are the supraorbital notch, the junction of the nasal bone and cartilage where the nasal nerve emerges, and the inner angle of the orbit where the trochlear branch becomes superficial. Other points which are less frequently the seats of pain are the upper eyelid and the eyeball itself, but in the last position the pain is said by the sufferers to be of a particularly distressing character.

In the distribution of the second division the most common foci are the infraorbital foramen, where the nerve of the same name emerges, and the malar foramen in the malar bone. Pain may also be experienced, but more rarely, along the upper gums or in the upper lip, and there may be a focus in the palate, a somewhat unusual one, but when it does exist it is the seat of intolerable pain.

In the territory of the third division, the inferior dental nerve and the lingual are the most common seats of severe pain, but it is also sometimes experienced in the auriculo-temporal region just in front of the ear, and more rarely in the lower lip. Anstie, in his work on neuralgia, states that another very common seat of severe pain is situated just above the parietal eminence but this is probably neurasthenic and secondary.

Besides the pain which the unfortunate patient suffers, certain objective changes are not uncommonly manifest in the parts where it is experienced. Frequently the skin has a glazed and hyperæmic appearance, due to the frantic energy with which the patient rubs the painful part; sometimes it has a moist, sweaty look, due to the accumulation of secretions which the sufferer, in dread of setting up a paroxysm, allows to remain undisturbed, and in some cases there is no doubt a true vasomotor or secretory disturbance leading to in-

creased vascularity or sweating over the part. In cases in which the lingual branch is affected there is frequently a unilateral furring of the tongue on the affected side, and this is present also even when this branch is not directly affected, and is apparently caused by some trophic change, aided by the circumstance that mastication is only carried on on the side of the mouth corresponding with the side of the face which is free from pain. When the pain is in the eyeball the lid is, as a rule, kept closed.

Nothnagel¹ says atrophy of muscles was noted by Cotugno (1760), but subsequent observations would seem to show that this is infrequent. Valleix saw 1 in 15 cases; Louis, 4 in 25; Nothnagel, 5 in 30. The wasting is ascribed to vasomotor cramp. Amongst other trophic troubles described may be mentioned blanching of the hair, thickening of the tissues; and Hutchinson and Bowman mention iritis and glaucoma.

With regard to etiology, one of the most striking features about it is the rarity with which it occurs in early life. It is not uncommon in middle life, but usually appears first between 40 and 50, at what may be said to be the commencement of the degenerative period. That it is dependent upon degeneration is not unlikely, but the question of the morbid anatomy of the condition will be discussed elsewhere. There is no reason to connect it with a malarial taint, but it can certainly be excited, if not caused, by cold, and its incidence very frequently follows long and unusual exposure, especially in one debilitated by physical work, but more particularly by mental worry.

One of the cases here recorded—the last but one in the table—suffered from the complaint at the unusually early age of 27. This is the earliest age at which I have seen true tic douloureux commence, and, so far as I know, it is the earliest age recorded for the incidence of this condition.

The treatment of the condition by drugs should first of all be thoroughly tried. Often it is quite ineffectual, but in some cases good results are obtained. Probably the best results are got from quinine, especially in combination with arsenic, and from gelsemium. Antipyrin is also useful in some of the slighter cases, and the same may be said of antifebrin. Opium can only be regarded as a palliative, and it has the great disadvantage of habituating the patient to a drug which has to be given in ever-increasing doses if it is to be effectual, and which has undoubtedly the further disadvantage of diminishing his power of bearing pain. The bromides are also used, but little can be hoped for from them. Chloride of ammonium is sometimes efficacious, and aconitin is strongly recommended by Dr. Seguin. It must be pushed until its physiological effect is fully experienced.

Counter-irritation in the form of blisters over the point of emergence of the nerve or along its course are also useful, and not infrequently give great relief. In this relation the recent introduction of chloride of methyl may be mentioned, although the experience of its use already obtained would seem to show that its efficacy in this condition is slight. Some observers are inclined to attach great importance to the use of galvanism. This is used as a weak current, which is gradually increased, and the effects in some cases are as good as can be got from any method of treatment. A systematic use of this remedy does not seem to have received as yet a fair trial.

But it must be confessed that all these various measures are in the end ineffectual. This is true of at least the severe cases, and the chief object of this paper is to point out the various means of surgical relief which have been proposed and which have been used for this distressing condition.

The operative procedures which have been recommended and carried out on the various branches of the fifth nerve for the relief of neuralgia are of four different kinds—namely, nerve-stretching, nerve-division or neurotomy, the excision of part of the nerve or neurectomy, and nerve-avulsion (Thiersch). Another way in which a part of the nerve is occasionally destroyed may be mentioned, namely, by thrusting into the foramen of exit a red-hot wire; but as this somewhat barbarous method of procedure must rely for its effect upon destruction of part of the nerve, and as this effect is produced much more completely and with much greater certainty by neurectomy, there is little to be said in its favour, and there is no reason to suppose that it will ever come into general use.

¹ *Trophische Störungen bei Neuralgien.*

Walsham² strongly advocates nerve-stretching, and records several cases in which various branches of the fifth were affected. In all there was relief, which in one lasted for at least three years without return; another case, when last heard of one year after operation, then continued free; a third was last seen three months after operation, and had until then remained without any attack.

F. Dumont³ also points out the efficacy of nerve-stretching in certain cases; in two especially, which he records, the relief was very marked. In one the infra-orbital was stretched; there was no return a year after. In the other the inferior dental was stretched from the mouth (Paravicini's incision), and in that case there was no return of pain in three years.

Müller⁴ says that Albinus and Galen suggested section of the nerve, and this was actually carried out by Mareschal, body-surgeon to Louis XIV. The motor nerves—for example, the facial—were supposed to be at fault. The operation consequently fell into discredit because of the want of success, and the general belief became established that the affection was central. Schuh, Patruban, and others revived it, excising portions of sensory nerves.

With regard to nerve-stretching it need only be said that the procedure as regards the fifth nerve differs in no way from that pursued with regard to other nerves. The branch in which the pain starts is exposed at its point of exit, a blunt hook is passed under it, and over this it is stretched. The result is in many cases good, but, unfortunately, not lasting, and in the hope of more permanent benefit division of the nerve, often combined with previous stretching, was practised; but as it was found that there was a recurrence of pain in the region of the nerve which had been divided, this being due to reunion of the divided ends, a means of avoiding this was sought in the excision of a part of the nerve—the operation of neurectomy.

Besides operations on nerves, it should be mentioned here that the more serious operation of ligaturing the common carotid has also been proposed and practised for the relief of facial neuralgia. It was first recommended by Nussbaum, and a series of cases has been published by Patruban,⁵ in some of which relief was obtained, while in others the operation had little or no beneficial effect. The success obtained was certainly not such as to justify its employment as a routine mode of treatment, and it may now be said to have practically dropped out of use as a means of treatment for facial neuralgia.

I shall now proceed to consider in detail the different branches of the fifth nerve on which operations are carried out, to describe the operations themselves, and the various modifications which they have from time to time undergone, and the results which may be hoped for from them.

First Division of the Fifth Nerve.—With regard to the branches of the first division on which operation is carried out, the supraorbital is the first which demands attention. The supraorbital passes out by the supraorbital notch or foramen to be distributed over the forehead. For the surgical treatment of neuralgia of this branch, stretching, division, or excision may be practised. The nerve may be stretched subcutaneously or by exposure in the usual way, a blunt hook being used to catch it up. Division also may be carried out subcutaneously, but the most satisfactory method of dealing with the nerve will be found to be by excision. This is carried out as follows. An incision is made parallel to and just below the superior orbital margin. The incision is to be an inch in length. After incising the orbicularis muscle, search must be made in the notch or foramen for the nerve and accompanying artery. These can be easily recognised and separated in strong light (electric), and search made for every branch of the nerve. The divided end is now pulled forward, and the terminal filaments dissected out and divided. At the same time the supratrochlear may also be dealt with in a similar way, as it is easy, as a rule, to follow back the supraorbital to the point where it is given off as one of the terminal branches of the frontal nerve, the other terminal branch being the supratrochlear.

But the supratrochlear may be dealt with by itself.

² *Practitioner*, 1884.

³ *Zeitschr. f. Chir.*, 1884, Bd. xix.

⁴ *Thesis*, Kiel, 1875.

⁵ *Allg. Wien. med. Zeitung*, 1876, p. 421.

Its position is indicated by a line drawn from the outer angle of the mouth through the inner canthus to the orbital margin. At this point of the orbital margin it is found to be either one or several fine filaments running from the orbit just above the pulley of the superior oblique. It lies deeply on the periosteum, and is best exposed by making a curved incision about half an inch long crossing its tract.

If strict asepsis be observed the small wound exposing these nerves should be completely united with horsehair sutures, and a light cyanide dressing applied firmly with a bandage.

Second Division of the Fifth Nerve.—Of this division the following anatomical points may be noted:—It passes through the foramen rotundum into the sphenomaxillary fossa, thence through the infraorbital canal to the infraorbital foramen. Before it approaches the face it gives off the following branches—temporo-malar, sphenopalatine, two or three dental branches. The infraorbital foramen corresponds with the junction of the inner and middle thirds of the orbital margin, and lies about a quarter of an inch below it.

Langenbeck⁶ recommended neurotomy by passing a tenotomy in at the outer angle of the eye. Billroth⁷ formerly made neurotomy subcutaneously, always dividing the nerve in several places over an extent of $\frac{1}{2}$ centimetre. Berard⁸ employed a T-shaped incision for the infraorbital. He only cut through the nerve and did not open up the canal. A. Wagner⁹ says Malgaigne first resected the infraorbital almost subcutaneously.

Patruban was the first in Germany,¹⁰ and Schuh was the next to carry this out.¹¹ Malgaigne¹² recommended exposing the nerve by a small incision, 1 centimetre below the orbital margin, passing a long strong tenotome along the floor of the orbit and cutting across the canal and nerve as far back as possible, and then drawing the nerve out through the canal. Agnew¹³ recommended varying the extent of the operation in the case of the second division according to the extent of the pain. Thus if the posterior dental nerves were not affected he would only remove the front of the nerve. But perhaps the method of dealing with the infraorbital nerve, which is usually followed, is that recommended by Wagner; Hildenbrand¹⁴ suggested a similar procedure, as follows: An incision is made parallel to the orbital margin and the skin reflected. The periosteum is raised from the floor of the orbit, and the nerve is cut through as it enters the infraorbital canal, and is then drawn through from the foramen in front. Wagner recommends that the canal in the orbit should be laid freely open by means of a chisel, the eyeball being held out of the way by a retractor, and the nerve can then be separated from the artery, raised and divided as far back as possible.

Sometimes the dental nerves are undoubtedly the source of infraorbital neuralgia, and in such cases Roux (de Toulon), so long ago as 1852, recommended, in the *Progrès Médical*, that the upper lip should be raised, the buccal mucous membrane divided, the antrum trephined and its lining membrane stripped off, and then that the segment of the maxillary tuberosity containing the superior and posterior dental nerves should be removed.

In spite of this very free treatment of the nerve, it was found that there was not infrequently a return of pain, and at length Carnochan¹⁵ recommended that the trunk of the nerve should be resected beyond Meckel's ganglion. The key of the operation he believed to be the removal of the ganglion. It was carried out as follows:—An incision was made commencing near the internal angle of the eye on the inferior edge of the orbit opposite the anterior lip of the lachrymal groove. The incision was carried downwards and outwards for about an inch to a point opposite the furrow on the lower part of the ala of the nose. Another incision was made, also terminating at this point, and commencing half an inch below the external angle of the eye, opposite the edge of the orbit,

thus forming a V-shaped flap in the area of which was situated the infraorbital foramen. The flap was thrown up, and the branches being found served as a guide to the trunk, which was isolated up to the point where it emerged from the canal. The lip was now everted and the mucous membrane detached from the superior maxilla along the line of junction of the cheek and gum. A sharp-pointed bistoury was then inserted at the apex of the V into the mouth, and carried downwards so as to divide entirely the tissues of the cheek and upper lip along a line passing midway between the ala of the nose and the commissure of the lips. The two flaps were then dissected from the bone and turned, one out and the other in. The whole anterior wall of the antrum was now exposed. A trephine was next applied to it with the infraorbital foramen at the upper margin and the cavity of the antrum exposed. The nerve was seen and carefully separated as far as the posterior wall of the antrum, bone forceps or chisel being used if necessary. The posterior wall of the antrum was now attacked with a chisel and broken down, and the sphenomaxillary fossa thus exposed. The trunk of the nerve was now isolated in the fossa, and the posterior dental nerve and the branches to Meckel's ganglion divided, and the trunk itself cut with curved scissors close to the foramen rotundum, and the exposed part removed.

In the three cases which Carnochan himself reported at the time when he published his paper, the operation was successful, but in two at least the interval which had elapsed between the date of the operation and the time when the cases were recorded was less than a year.

Grister¹⁶ reported three cases, in which, on account of the limited space and the bad light available in Carnochan's operation, he performed temporary excision of the upper jaw, but as in one suppuration occurred and in another a part of the bone necrosed, the procedure is not one which is likely to commend itself.

Chavasse¹⁷ also reported two cases in which he carried out an operation similar to Carnochan's, and nine months after it there was no return of pain in either. The points in which he modified Carnochan's procedure were that instead of Carnochan's V-shaped incision with the subsequent cut downwards from its apex, he made his first incision along the lower orbital margin, and his second from this down to the angle of the mouth without opening into it. Instead, also, of breaking through the posterior wall of the antrum with a chisel he used a small trephine, but the way in which the nerve was treated was essentially the same as in the older operation. Clutton similarly obtained excellent results.

Fowler¹⁸ operated in the same way as Chavasse, and so did Rockwell.¹⁹

Such an operation as that just described, although possessing the undoubted advantage of enabling one to reach the second division of the nerve as far back as it can be reached without going inside the skull, possesses the great drawback of attaining its object only through laying open the cavity of the antrum, and in Carnochan's at least, that of the mouth. Professor Lücke, of Strassburg,²⁰ while having the same object in view, namely, the division of the nerve at the foramen rotundum, proceeded by an entirely different method, namely, temporary excision of the zygomatic arch. He made an incision 1 centimetre behind the external angle of the eye in the anterior and lower corner of the temporal fossa, and carried it downwards and forwards into the region of the third upper molar tooth. Here a sharp process can be felt—the commencement of the zygoma. The soft parts are separated, and the zygomatic process of the malar is laid bare. This is sawn through, the saw being directed inwards, so that the surface may be such as to furnish a good support when the bone is replaced.

The zygoma is then fractured posteriorly, with the attached fascia turned upwards and the sphenomaxillary fossa opened into. The nerve is then followed from the hinder end of the infraorbital canal to the foramen rotundum and this piece excised. This operation results in considerable deformity, the result apparently of the division of the masseter, and a modification of it with the object of preventing this deformity

⁶ *Archiv*, xi, 1869.

⁷ *Chirurg. Klinik*, Berlin, 1879.

⁸ Quoted by Vallex. *Traité des Névralgies*, 1841.

⁹ *Virch. Archiv*, 1886, ix, 594.

¹⁰ *Wien. med. Woch.*, 1853.

¹¹ *Ibid.*

¹² *Manuel de Méd. opératoire*, 4th ed., p. 153.

¹³ *Prin. and Pract. of Surgery*, vol. ii.

¹⁴ *Nervendehnung, Neurotomie u. Nervennaht*, Berlin, 1884.

¹⁵ *Amer. Journal of the Med. Sciences*, vol. xxxv, 1858.

¹⁶ *Phil. Med. News*, 1884.

¹⁷ *Med.-Chir. Soc. Trans.*, 1884, vol. lxvii.

¹⁸ *New York Med. Record*, 1884, vol. ii, p. 369.

¹⁹ *Annals of Surgery*, 1885, vol. i, p. 335.

²⁰ *Zeitschr. f. Chir.*, 1875.

was suggested by Professor Lössen, of Heidelberg.²¹ After making a similar incision he divides the temporal fascia above the zygoma. The bone is then divided anteriorly and posteriorly; but instead of being turned up as in Lücke's operation it is now turned down and the fossa exposed as before. After it is replaced, the fascia on the bone and that from which it was separated are reunited and the resulting deformity is almost nil. Braun²² records several cases treated by this operation, and in only one had there occurred, up till the time at which the paper was written, a slight return of the pain.

Such is Lücke's operation with the modifications which were introduced subsequently. I shall point out directly, in describing Pancoast's operation and its modifications for reaching the inferior division of the nerve in the pterygoid fossa, that this latter procedure really enables the surgeon to reach both the second and third divisions. I shall not discuss this further at present. Its consideration is postponed until the operation on the third division is described.

In dealing with neuralgia of the second division the procedure to be followed should, I think, be practically that of Carnochan as modified by Chavasse, for I have seen complete cure for over five years follow this operation (see Table). It has also the advantage that the wound can be got to heal by first intention, and that the scar which is left is practically invisible.

In removing the middle division from the front I always employ the following procedure, based upon the work of the above mentioned observers as well as on my own experience. The first essential is to secure the eyelid so as to prevent the access of any strong lotion to the eyes, and obviate the danger of conjunctivitis. The injury done in this way may be very severe, and I have seen it in one case lead to keratitis. The closure of the lids is best accomplished by simply passing a horsehair suture through the skin about a quarter of an inch from the tarsal margin, and knotting it firmly. An incision following the lower orbital margin is then made, and a small one, one half to three quarters of an inch in length, joining it at right angles, and lying over the position of the foramen, which, as before said, is well to the inner side of the mid-line of the orbit. It is best to cut straight through the tissues to the periosteum, and then to strip the periosteum down from the front of the upper jaw, thus exposing the nerve at its point of exit from the foramen. Then it can be easily separated from the artery, and both nerve and vessel can be separately secured by a silk ligature and divided peripherally. The next step is to raise the contents of the orbit from its floor. The periosteum has already been divided along the margin of the cavity. The edge of it must now be carefully raised, and the membrane, which in some parts is very thin, detached from the orbital floor. If it be preserved intact the fat filling the cavity, which is so great a hindrance to the operation, is very easily kept out of the way. The next point is to open up the foramen and the canal as far back as the spheno-maxillary fissure. The blade of a sharp pointed pair of bone forceps should be introduced into the canal and the bone chipped upwards, so as to leave only a small notch in the orbital margin. The same instrument or a dura mater elevator will raise and detach with ease the roof of the canal, which is usually only present in the anterior half of the groove. The nerve and artery can now be separated from one another for the whole length of the orbit and the nerve can be detached from the base of the skull at the foramen rotundum.

In the performance of this operation, the antrum in a certain number of cases will not be opened at all. In others it will extend so far up into the margin of the orbit as to make it impossible to avoid opening the cavity. Should this be done, however, the inconvenience is slight, and if the bottom of the wound be filled with boracic powder the whole can be properly sutured, and union obtained by first intention. Formerly, in cases in which the antrum had been opened, I was in the habit of draining the wound, but further experience showed that this was unnecessary. By separating and securing the artery hæmorrhage can be avoided, and rapid healing of the wound ensured.

Should recurrence unfortunately occur after this operation,

I should then prefer to carry out the modified Pancoast's operation, of which a description will be given later.

Third Division of the Fifth Nerve.—Although the lingual or gustatory branch of this division is occasionally affected with the paroxysmal neuralgia peculiar to the fifth nerve, and more rarely the buccal and auriculo-temporal branches, by far the most frequently affected branch is the inferior dental and its continuation, the mental.

The lingual or gustatory branch of the inferior division of the fifth nerve passes down under cover of the external pterygoid muscle, lying internal to and in front of the inferior dental. It then passes between the internal pterygoid and the lower jaw, and is inclined obliquely inwards to the side of the tongue. It crosses the duct of the submaxillary gland, and is continued to the apex of the tongue.

Operations on the nerve may be carried out from the mouth or from the outside, in the manner to be described in connection with the inferior dental nerve, and it has also been suggested that it might be operated on in the digastric triangle.

The buccal nerve and the auriculo-temporal are easily exposed, the former from the mouth by dividing the mucous membrane opposite the middle of the anterior margin of the ascending ramus of the jaw, and the latter as it crossed the zygoma between the temporal artery and the pinna of the ear. The former operation is very disadvantageous (*vid. inf.*).

The operations for relief of pain in the district of the inferior dental may be divided into (1) those in which the nerve itself is attacked from the mouth, (2) those in which it is attacked from the outside, either as it enters the canal or after it is in it, and (3) those in which the third division of the nerve is sought at the base of the skull. The last operation, of course, is available not only for cases in which the pain is in the distribution of the inferior dental, but when it occurs anywhere in the region of the third division.

The operation which is done from the mouth is what is known as Paravicini's operation. It is carried out as follows: The jaws are widely opened, the angle of the mouth on the side on which the operation is to be is drawn down and out, and the mucous membrane is incised for an inch along the anterior border of the ascending ramus of the lower jaw. The incision is carried down to the bone, and the periosteum with the soft parts detached until the dental foramen is exposed. The nerve can now be seized and separated, and about an inch of it, if desired, can be excised. The lingual nerve crosses the lower extremity of the wound, and it too, if desired, can be dealt with here. Of course the great objection to such an operation is the certainty of the wound becoming septic, and the consequent inconvenience and danger to the patient, not only from the danger of local necrosis, but of general infection.²³ It may now be said to be very rarely practised.

Of the methods of getting at the nerve before it enters the canal, that of Velpeau²⁴ is the oldest. He proceeded by displacing and chiselling away the surface of the under jaw above the angle until the nerve was exposed. In the similar method of Kühne and Brun a piece of the lower jaw above the angle was sacrificed. In Sonnenburg's and Lücke's method recourse was had to position particularly. The nerve was sought with the head hanging down. An incision was made round the angle of the jaw corresponding with the insertion of the masseter, the soft parts were raised from the inside of the bone with an elevator, until the inferior dental, and in front of it the lingual, could be felt with the finger. A hook was then passed round the nerve as it entered the canal, and part removed.

Various methods of exposing the nerve in the canal have been used. Agnew²⁵ makes a horseshoe flap over the ramus of the jaw and masseter with the convexity downwards. It was $1\frac{1}{2}$ inch vertically and $1\frac{1}{2}$ inch transversely. The external wall of the ramus was trephined $\frac{1}{2}$ inch above the angle, and $\frac{3}{8}$ inch behind the last molar. Garretson²⁶ makes his incision along the lower border of the ramus, and thus exposes it for 2 inches. Two longitudinal cuts are made $\frac{1}{2}$ inch apart through the outer wall, and the canal exposed with chisel and hammer. An exactly similar procedure to that of Gar-

²³ Consult Pitts, *St. Thomas's Hospital Reports*.

²⁴ See Obalinski, *Wien. med. Presse*, 1889, p. 336.

²⁵ *Princ. and Pract. of Surgery*, vol. ii.

²⁶ *Ibid.*

²¹ *Centrab. f. Chir.*, 1876.

²² *Centrab. f. Chir.*, 1882.

retson is recommended by Hildenbrant.²⁷ Beau,²⁸ of Toulon, used a semilunar flap in the cheek from a little behind the anterior border of the masseter to the chin, turned it up, and trephined over the entrance of the inferior dental nerve and divided it. He then exposed the mental nerve at its foramen of exit, thoroughly freed it and pulled the above piece through, the mental branches having been dissected out and divided.

In Warren's method an incision was made from the sigmoid notch to the lower border of the jaw. The fibres of the masseter were cut, and a trephine of 20 to 25 millimetres applied below the notch, exposing the nerve and vessels. The nerve was drawn down and 11 millimetres excised. Velpeau's modification of this consisted in raising a V-shaped flap with the convexity downwards, avoiding injury to the parotid. Galignani²⁹ recommended an incision along the lower border of the jaw, and behind the ramus, as high as the lobule of the ear. The periosteum was raised until the tendinous insertion of the internal pterygoid was reached. This was divided and the periosteum elevated until the dental foramen was reached. The nerve was drawn down with a hook and $5\frac{1}{2}$ millimetres excised. Weir Mitchell³⁰ trephined at the angle of the jaw and excised part of the nerve. He also suggested blocking up the end of the canal to prevent re-union.

These are some of the numerous operations proposed and actually carried out for the relief of neuralgia of the inferior dental nerve. Further, the body of the jaw or the ascending ramus has been perforated by the dentist's drill (Tomes) so as to completely destroy the nerve, that is, cut it across. All these operations have the disadvantage that the nerve is not sufficiently removed between the foramen ovale and the upper end of the inferior dental canal. It was to provide a means of doing this without injury to important parts that I suggested and have frequently carried out the operation which I shall now describe. In devising this operation the objects which I had in view, besides that alluded to, were: (1) To secure separation of the lingual and inferior dental nerves from their continuation with the main trunk just outside the foramen ovale. (2) To effect this without notable scar and without injury to such important structures as the facial nerve, parotid gland and the articulation of the lower jaw. (3) To see clearly every step in the operation and to have the nerve in view, not only where it is first exposed, but where it is divided. (4) To obtain immediate union of the wound.

(To be continued.)

REMARKS ON THE USE OF ELECTRICITY IN GYNÆCOLOGY.

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HAVING worked at this subject for now four years, we are induced to put before the readers of the BRITISH MEDICAL JOURNAL our experience of it after giving it a fair trial. We shall not enter into the details of apparatus, etc.; this can be learnt from Apostoli's published works. We will simply state what we consider to be the value of the continuous current and of the interrupted current in the treatment of certain diseases peculiar to women.

We may state that the amount of knowledge of electricity that is required to carry out this treatment can be very easily acquired by anyone who is willing to devote a little time to obtain it from books and from conversation with electricians, but we consider that something more than a mere smattering of knowledge of diseases of women is necessary to avoid mistakes, which even with the most experienced will sometimes creep in. We have used the galvanic current over 500 times

²⁷ Loc. cit.

²⁸ *Union Médicale*, 1855, 161, etc.

²⁹ *Gazette des Hôpitaux*, 1889.

³⁰ *Phil. Med. News*, 1882.

in 100 separate cases without any ill result, and in most of them with benefit.

Myoma Uteri.

The first set of cases we will take will be that of myoma uteri. We have used it for growing fibroids without bleeding, and for the same class of tumours with bleeding, for stationary tumours accompanied by bleeding, and for the same kind of tumours without bleeding but accompanied by pain. The results have been as follows: There has not been a very great reduction in the size of the tumours, but rapidly growing tumours have been checked in their growth in all instances except one. The bleeding has been lessened in a very marked degree by the intrauterine use of the positive pole. The pain also has been lessened and in some cases removed entirely. The general health has been much improved, the feeling of weight has been removed to a great extent, and this out of all proportion to the diminution of the size of the tumour.

In a short paper like this we cannot quote details of cases. We simply give our opinion after working at the subject. We do not regard electricity as a means of cure or even of relief in all cases of myoma uteri; we regard it as a very valuable addition to our means of treating a very troublesome set of cases. Fibroids of the uterus have been often classified according to their position in the walls of the uterus; this to a certain extent is useful, but we are sure what is often of as much importance is the fact of their being accompanied or not by any other diseased pelvic condition, especially disease of the uterine appendages. An ordinary uterus will bleed most profusely in some cases when there is disease of the appendages; how much more so then will a fibroid uterus bleed when complicated with a similar disease? These cases we regard as least amenable to the electric treatment, and in all probability they require removal of the diseased appendages with the double result of removing diseased organs and bringing about the menopause.

The removal of the appendages does not always check the uterine hæmorrhage. We have had placed under our care for electric treatment a patient from whom a very able surgeon removed both appendages; this young woman has had profuse uterine hæmorrhage ever since the operation. We dilated the uterus and found a myoma situated in the anterior wall and bulging well into the uterine cavity. She has had two applications of electricity and the uterus is already much smaller, and the hæmorrhage has lessened although it has not yet ceased entirely. We have followed the rules laid down by Apostoli, and can to a great extent verify his statements.

Subinvolution.

In ordinary cases of subinvolution of the uterus the intra-uterine application of the positive pole with a current of 50 milliamperes given once a week for three or four times has a very good effect, the uterus very rapidly undergoing involution. The cases do best where the enlargement of the uterus is the principal lesion; those cases complicated with endometritis are best treated by ordinary intrauterine medication and curetting.

Dysmenorrhœa.

In cases of dysmenorrhœa, due to a narrow condition of the cervix uteri, the intrauterine use of the negative pole causes at once a dilatation of the canal, which remains permanent, and removes the pain which was due to the stenosis. We know of no treatment so effectual for the relief of pain in these cases if the cause is simply a narrow canal.

Often these cases are complicated with tubal or ovarian disease; if so, after dilating the canal with the galvanic current, the faradic current should be used for the relief of the other pain.

Caustic Action.

Destruction of diseased tissue is most easily effected by the negative pole either by puncturing or simply by touching. It is most useful in urethral cases, and in chronic inflammatory deposits in the pelvis, in order to assist absorption or to drain away pus, etc.

The Faradic Current.

Although relief of pain is very marked by the use of the galvanic negative pole within the uterus, yet the best agent for this purpose is the faradic current. To relieve pain by the faradic current it is necessary to attend to a few brief directions.

In a very large class of cases, all that need be done is to