

swelling did not increase during the next monthly period when the patient was under my care, and I found at the operation that it was not a hæmatometra or a hæmatosalpinx. We must therefore turn back to the local peritonitis. The patient in this case was evidently exposed to some unfavourable influence which caused peritonitis around the cyst.

In my first case, reported in 1898, the patient, aged 59 years, had been subject for nine months to pain in the lower part of the abdomen; the cyst was then detected, and symptoms of peritonitis came on periodically until two months later, when I operated. I find on referring to my original case-book that the menopause had become complete over nine years before—that is, when the patient was about 50. In fact, there is no reason to believe that the catamenia had anything to do with either case. In both I found omental and intestinal adhesions to the parietal peritoneum lining the back of the cyst. Other writers, Delore and Cotte, Weiser, &c., have reported similar complications. Indeed, peritonitis seems to be the rule when a urachal cyst has reached proportions sufficient to give rise to symptoms leading to its detection.

These symptoms appear very irregularly, which is one reason why *encysted dropsies* and *tuberculous peritonitis* are so apt to be confounded with urachal cysts. The error of mistaking the former for the latter, into which Hoffmann and Tait fell, has, as I have been at some pains to explain, greatly impaired the value of statistical records of urachal tumours.

*Age.*—In the present case the patient was 17 years of age, in Weiser's she was only 11 years, and in Delore and Cotte's 20 years. Urachal cysts are relatively frequent in young girls, and as they are likewise subject to tuberculous peritonitis and to inflammation of the vermiform appendix we can see how easily errors of diagnosis may occur.

#### *Surgical Treatment of Pure Urachal Cyst.*

Any communication between the interior of a urachal cyst and the cavity of the bladder, or the surface of the body at the umbilicus, greatly increases the difficulties and dangers of operative measures. It is partly on that account that I have confined my observations almost entirely to pure urachal cysts. Whenever it seems fairly clear that a cyst of this kind can be extirpated without the dangers of dissecting in the dark amidst uncertain relations posteriorly the radical operation should be undertaken. This, however, itself not free from risk even under the most favourable circumstances, is not always possible, as shown by the reports of many surgeons, whilst in the present case the posterior wall, for special reasons already given, could not have been safely separated from the abnormal structures in close relation to it. We must remember that in urachal fistula the insertion of the ureters into the bladder may be abnormally high (Mikulicz), and we are dealing with a malformation closely related to fistula. The surgeon must in many cases be content with partial measures which, as I have explained, were successful in Weiser's, E. D. Ferguson's, and my own two operations. As much as possible of the inner lining membrane must be dissected away; in the present case this was readily effected, but in my 1898 case it was impracticable, the membrane having been destroyed by degenerative changes. Partly on that account and partly because the tumour was bilocular I found drainage necessary. A sinus developed but closed within six months, nor did it ever open again. The patient died from cancer of the pylorus and pancreas six years later. In the present case there was no indication for drainage. The firm and fairly thick main wall of the cyst, fibromuscular or purely fibrous, is very favourable for treatment by whip-stitching or any similar plastic procedure suitable according to circumstances.

During the operation, complete or partial, the surgeon must always carefully ascertain the relations of the cyst to the bladder. If the cyst be sessile it may be impossible to remove it without damage to the walls of the bladder, which will therefore require repair by suture. When, on the other hand, the cyst is separated from the bladder by a segment of urachus, it must be remembered that the segment may have an open canal communicating with the bladder. The microscope showed that in the present case (Fig. 2) it was open, although there was no proof that it actually ended unobstructed in the bladder. Lest a urinary fistula should develop, as appears to have happened in a case described

by Ill many years ago, that writer treats the divided segment as though it were a vermiform appendix, turning in its cut edges and applying a Lembert suture. In the present case I transfixed the segment and tied it as though it were a pedicle of an ovarian cyst. In any case, it should not be tied without transfixion as though it were an artery. The loop might easily loosen or come away, and the canal would then be patulous. We know that this may happen when the stumps of both Fallopian tubes have been ligatured in a double ovariectomy, as pregnancy has followed, which means that the canal of one tubal stump must have transmitted an ovum from the relics of one ovary. Should the ligature come away from the urachal stump a urinary fistula of a very bad type would develop if Wutz's valve were forced open by over-distension of the bladder. The risk of such a complication under these circumstances, and the fact that a pure urachal cyst in males is occasionally converted into a secondary cystic fistula full of urine, reminds the surgeon that, as I have already remarked, we ought to be more sure about Wutz's vesico-urachal valve, or whatever it may be, that really protects the vesical orifice of the urachus.

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## THE ALCOHOL INJECTION TREATMENT FOR NEURALGIA AND SPASM.

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THE treatment of trigeminal neuralgia, or "tic douloureux," by means of drugs, electricity, vibration, percussion of the nerves at their points of exit from the foramina upon the face, and other devices of various kinds has always proved a failure in genuine severe cases of this extremely painful disease, ever since Trousseau 50 years ago drew attention to it under the title of "epileptiform neuralgia." Peripheral injection of the painful spots by means of osmic acid, chloroform, cocaine, &c., has given relief for short periods, varying from hours to a few weeks, but hitherto real relief has only been obtainable by means of surgical aid. Resection of the various branches of the fifth nerve, either peripherally at their points of exit from the foramina upon the face, or more centrally in the zygomatic fossa, or intracranially, has brought relief from the pain for several months or even years, the results being generally better the nearer the resection is done to the Gasserian ganglion. Permanent cure does not result from resection, as with the regeneration of the nerve fibres and consequent disappearance of the anaesthesia on the face which was produced by the division of the nerve the pain returns eventually with equal or greater severity, probably being hastened in some cases through the irritation of the nerve by the cicatricial contraction of the scar tissue resulting from the cutting operation. This scar tissue produced by resection operations makes a second operation at the same spot practically impossible, and

consequently, when the spasms of pain return owing to the regeneration of the nerve it will be necessary to resect the nerve at a point nearer to the skull, or even intracranially. Owing to the unsatisfactory results on the whole of resection the operation of extirpation of the Gasserian ganglion was devised, and in the hands of skilful surgeons permanent relief from the pain has been obtained in a considerable number of cases. It is, however, a very difficult operation to remove the ganglion completely, and, if only partially removed, the pain may continue unabated, or may return later. The severity of the operation is, moreover, indicated by the percentage of deaths resulting from it, even in the most experienced hands, and the scarring and deformity produced by the operation are also disadvantages.

It is owing to the introduction by Schlösser in 1903 of his method of deep injection with 80 per cent. alcohol of the main trunks of the fifth nerve at their points of emergence from the skull that the principle of resection is again justified. Injection of a nerve with alcohol of over 70 per cent. strength causes immediate paralysis of the functions of the nerve, with the setting up of a degenerative neuritis extending from the point of injection to the periphery. With a purely sensory nerve, such as the superior maxillary, the second division of the fifth nerve, anæsthesia will be produced over the area of the skin of the face and mucous membrane of cheek and gum supplied by the nerve, with at the same time more or less œdema of the skin. If a mixed motor and sensory nerve is injected with the alcohol, such as the median or the sciatic, motor paralysis as well as anæsthesia will result—a fact to be clearly borne in mind when applying this treatment to such mixed nerves.

This method of local destruction of the nerve fibres by deep injection of the nerve trunk with strong alcohol is in reality an extremely elegant method of resection of the nerve, and the after-history of the cases is somewhat similar, inasmuch as regeneration of the nerve fibres takes place after several months, the anæsthesia gradually disappears, and in cases of severe trigeminal neuralgia the attacks of pain are likely to gradually reappear, the interval of freedom from the pain varying from four or five months to as long as 18 months or more. The great advantage of the deep injection method over resection of the nerves lies in the absence of scarring and the consequent fact that injection of the nerve may be repeated at the same point an indefinite number of times. Moreover, it is probable that after resection of a nerve the formation of scar tissue in the wound irritates the central end of the nerve after division and surrounds the new nerve fibres after regeneration, thereby tending to shorten the period of relief after division of the nerve, and also ultimately to increase the pain from irritation. This factor is absent with the injection method, as the track of the needle leaves practically no scar, and the point of entry of the needle on the cheek is in most cases impossible to identify a week after the injection. Schlösser has also found, after an experience of 123 cases of trigeminal neuralgia treated by this method, many of them repeatedly injected at intervals for recurrence of the pain, that practically every case can be relieved by this procedure, that the average period of relief from pain obtained is over ten months, and that the interval of relief from pain obtained lengthens after each successive injection. These facts alone are sufficient to warrant an extended trial of the method, and it has been a matter of surprise to me that no literature on the subject has appeared in this country, and that when I first began to use this treatment last August I could hear of no one else who had tried it, and indeed very few who had as much as heard of it. On the Continent and in America many are using the mode of procedure, with apparently the same success as did Schlösser, and good descriptions of their modifications of the method of deep injection have been published in Paris by Ostwalt, and by Brissaud and Sicard.

In the October (1908) number of the *Practitioner* in my review of neurological literature I gave a description of the treatment, and on Feb. 25th, 1909, I read a paper on my experiences of the method on 13 cases before the Neurological Section of the Royal Society of Medicine, demonstrating the method on the skull, and I also showed two patients, both subjects of trigeminal neuralgia affecting the left second division of the fifth nerve, whom I had injected with alcohol four and a half months and three weeks previously respectively, with complete disappearance of the pain in each case. Up to the present time I have used the

alcohol injection treatment in 17 cases, six of which are cases of paroxysmal trigeminal neuralgia.

*Trigeminal neuralgia.*—In one case only, one of my earliest cases, did I fail to relieve the pain, due to my failing to reach the foramen ovale through faulty technique. In this case the pain was mostly in the third division, affecting the lingual nerve, in a woman, aged 55 years, who had been subject to the attacks of pain for the past 17 years, for part of the time the pain being bilateral, a very rare condition in trigeminal neuralgia. In each of my other five cases the pain has been immediately relieved, though the last case was done so recently as a week ago that it is premature to speak yet of a cure. Of the remaining four cases, one patient—a case of 11 years' duration in a woman, aged 63 years, affecting the left second division of the fifth nerve—has had five months' relief from her attacks of pain since I injected the left infra-orbital nerve and the palatine foramina in October last. This was followed by complete anæsthesia of the cheek and palate, with complete disappearance of the pain, which was so severe, and the attacks of which were so frequent, that she said she thought she "would have gone mad." The attacks of pain were started by eating, talking, touching her nose or upper lip, or would come on spontaneously, especially at night. During the last month the anæsthesia has been gradually lessening on the upper lip and cheek, and the attacks of pain are commencing to come on again, though not yet with such severity as formerly. She has asked me to inject the nerve again, and this time I shall inject the superior maxillary nerve close to the foramen rotundum, in addition to again injecting the infra-orbital nerve and the anterior palatine nerve. By attacking the main trunk of the nerve close to the skull, as well as destroying it peripherally, the period required for regeneration of the nerve fibres, and the consequent relief from the attacks of pain, is likely to be longer, and I shall hope to obtain for her not less than six months', and possibly longer, freedom from return of the pain. Of the remaining three cases, one was a case of three years' duration of spasms of pain affecting the right third division of the fifth nerve in a woman aged 78 years. Early in December I injected 80 per cent. alcohol around the foramen ovale, causing complete passing away of the pain. In this case the injection was perineuritic, not into the substance of the inferior maxillary nerve. Consequently, although a certain degree of numbness along the jaw was produced, there was no anæsthesia, and yet the attacks of pain completely subsided, although before the injection they were so severe and frequent that scarcely any food could be taken, and that only in a liquid form.

Another case of epileptiform neuralgia, affecting the left second division of the fifth nerve, occurred in a woman, aged 40 years, who had suffered severely for six years. I saw her in several of the attacks of pain, the most severe and intense that I have ever witnessed. The slightest touch on the upper lip or side of the nose would start an attack, causing her to scream out, to clasp her hands to her head, and to moan and rock with the pain for about three-quarters of a minute. In such a case, it appears to me, it would be more than brutal to attempt to inject without employing a general anæsthetic, though it is the practice of all the continental and American workers, following Schlösser, to use no anæsthetic. Eight weeks ago under chloroform I injected the second division of the fifth nerve of this patient at the foramen rotundum with 15 minims of 80 per cent. alcohol, and also injected a few minims into the infra-orbital foramen. The result was perfect, there being complete loss of pain and inability to start it in any way by rubbing the skin of the face, blowing the nose, or any of the movements which formerly infallibly induced the attacks. There was considerable œdema of the cheek and upper lip for three days, which then disappeared completely, though the anæsthesia of the area of skin and mucous membrane supplied by the superior maxillary nerve remained complete.

Another case of trigeminal neuralgia affecting the first or ophthalmic division on the left side, in a woman, aged 54 years, who had suffered from recurrent severe spasms of pain over the eyebrow for the past eight years, was completely relieved after two injections at the supra-orbital notch, mental foramen, and under the skin of the outer portion of the eyebrow and forehead. Although the pain was limited to the ophthalmic division of the nerve there was a sensitive area on the left side of the chin in front of the mental foramen,

pressure on which, or sometimes even touching, would start the supra-orbital pain. At the first injection with alcohol I had overlooked the fact that there was an area on the outer part of the eyebrow which was very sensitive, though less so than the region of the supra-orbital notch, and it was not until the pain and sensitiveness of the supra-orbital region and the chin had passed away as the result of the first injection that I became aware of this painful area on the outer portion of the forehead, pain in which was started by rubbing the skin of the upper eyelid or the eyebrow. A second injection under the eyebrow and again of the supra-orbital nerve made this region also anæsthetic, and all the attacks of pain were completely subdued.

In addition to these cases of true trigeminal neuralgia, I have also treated three cases of severe recurrent supra-orbital neuralgia, post-influenzal in origin, with injection of alcohol and eucaine around the supra-orbital notch. In each case one injection has been sufficient to relieve the pain at once, causing anæsthesia of a patch of skin above the eyebrow. The characteristic of these post-influenzal supra-orbital neuralgias is their daily recurrence, usually starting about 10 o'clock in the morning, reaching their maximum intensity of pain after an hour or two, and dying away after 4 P.M. or 5 P.M. The pain is often intensely severe, though it differs from true trigeminal neuralgia in the long continuance of the attack, the spasms of pain in trigeminal neuralgia rarely lasting more than from one-half to three-quarters of a minute. If untreated, these post-influenzal supra-orbital neuralgias may recur daily for three weeks or longer. After the alcohol injection, although the pain is almost instantaneously relieved, a neuralgic attack may return about three hours later after the action of the eucaine has worn off. This is at once controlled by the administration of a dose of pyramidon and effervescent caffeine citrate, and there is usually no further pain, though sometimes a second injection is required.

Pain in the face due to implication of the branches of the fifth nerve by cancer of the tongue or tonsil, or by growths at the base of the skull, may be relieved completely by deep injections of alcohol into the second or third division of the fifth nerve at the foramen rotundum or foramen ovale. I have thus completely relieved two such patients.

One patient was a man, aged about 46 years, who was suffering from a tumour at the base of the skull, probably involving the sphenoid bone. He became gradually blind from optic atrophy, and later developed paralysis of the left external rectus, and began to suffer violent pain in the face on both sides, with anæsthesia of the right cheek. The pain became almost unbearable, and as anti-syphilitic treatment did no good, I injected both infra-orbital foramina with 80 per cent. alcohol. This completely relieved his pain for the time, but later pain was felt along the left lower jaw, indicating the extension of the growth to involve the left inferior maxillary nerve. I therefore, under an anæsthetic, injected the left inferior maxillary nerve at the foramen ovale with alcohol, and the patient when last heard of had remained quite free from pain for several weeks.

The other case of inoperable carcinoma of the tongue was that of a patient who was sent to me from the surgical out-patients at St. Mary's Hospital because of the severe pain from which he was suffering in the left side of the tongue and jaw. Without using any anæsthetic, I injected the left inferior maxillary nerve at the foramen ovale with 80 per cent. alcohol, causing anæsthesia of the chin and complete loss of the severe pain.

Three cases of *clonic facial spasm* I have also cured by injection of alcohol around the exit of the facial nerve from the stylo-mastoid foramen. This causes slight paresis of the nerve, but brings about immediate cessation of the clonic spasms of the facial muscles. If the nerve is actually punctured and injected with the strong alcohol, complete facial paralysis will be produced, though this will be recovered from in two or three months.

*Sciatica* may be successfully treated by injections of strong alcohol, though I am quite convinced that the injections must be perineuritic, not into the substance of the nerve. I have proved that the injection of five minims of 80 per cent. alcohol into the median nerve causes paralysis of the flexors of the fingers and of the radial flexor of the wrist, followed by reaction of degeneration in these muscles, in addition to analgesia of the median distribution on the hand. Cases have also been published of paralysis of the

leg following an alcohol injection into the nerve, and these, together with Finkelnburg's experimental work on the same point, completely disprove Schlösser's statement that he injects 15 minims or more into the sciatic nerve for sciatica, curing the pain without causing any paralysis. What he really does, no doubt, is to inject the alcohol around the sheath of the nerve, not into the nerve itself, and this perineuritic injection may be sufficient to relieve all pain, as indeed occurred in one of my cases of trigeminal neuralgia, affecting the right third division of the fifth nerve quoted above. Such a perineuritic injection of 80 per cent. alcohol I made recently in a case of sciatica of seven weeks' duration, bringing about immediate relief from the pain. The actual injection of the alcohol is somewhat painful, but the pain passes off after a few seconds. The actual insertion of the needle may be made practically painless by freezing the skin with ethyl chloride. The nerve lies at a depth of from two to three inches from the surface at the lower gluteal fold, which is generally the best point to choose for the injection. No general anæsthetic should be given owing to the danger of puncturing and injecting the nerve itself, and the patient's sensations will be the guide as to when the point of the needle reaches the sheath of the nerve, practically no pain being felt after the skin puncture until the sciatic nerve itself is reached. It is not always an easy matter to hit off the nerve, and those who imagine that they are treating sciatica by acupuncture of the nerve by thrusting from four to six needles into the nerve, are, I am sure, deluding themselves; most, if not all, of the needles do not hit the nerve at all, but pass to one side of it. I have proved this several times in the post-mortem room by attempting to inject the sciatic nerve at the lower gluteal fold with methylene blue and then dissecting down to my injection, and have found almost invariably that my injection has been to one side of the nerve, once as much as an inch and a half to one side. However, the nerve may be hit, and therefore I think it necessary that no general anæsthetic should be used, as the point of the needle must feel for the nerve, and the patient's sensations of pain down the leg will be the guide when the sheath is reached.

*Technique for trigeminal neuralgia.*—In all cases of trigeminal neuralgia all tender spots, irritation of which gives rise to the pain, should be injected subcutaneously with several drops of the 80 per cent. alcohol. This is a comparatively simple procedure. Next, the various superficial foramina, such as the mental foramen for the third division, the infra-orbital foramen for the second division, and the supra-orbital notch if the ophthalmic division of the nerve is affected, should also be injected with a few drops of the alcohol. Of these the mental foramen is the most difficult to hit. Other foramina that may also be injected in suitable cases are the inferior dental, the palatine, the malar, and the anterior ethmoidal for the nasal branch of the first division. For the inferior dental a strong curved needle must be used and it may be reached either round the back of the ascending ramus of the mandible or from within the mouth.

Deep injections of the second division of the fifth nerve in the sphenomaxillary fossa at the foramen rotundum and of the inferior maxillary nerve at the foramen ovale require a great deal of practice. This must be acquired first upon an articulated skull and then in the post-mortem room. Many different articulated skulls should be studied in order to become familiar with the bony variations that are liable to be met with in the zygomatic fossa and in order to become acquainted with the varying depth of the foramina from the surface in different sized skulls. Although general directions can be given for reaching these two deep foramina, unless absolute familiarity with the base of the skull in this region is attained to the degree of being able to call up a mental picture of the parts, and thus recognise what the point of your needle is doing, frequent failure is sure to result and great damage may be done. In order to attain the certainty of placing my injection in the foramen ovale, or foramen rotundum, I have found it necessary to practise on a large number of articulated skulls and in over 60 bodies in the post-mortem room, using methylene blue for my injection in the latter, and tracing the course of the injection after taking out the brain. My methods are, roughly, as follows.

For the *foramen ovale* I use a moderately stout hollow needle, 1.2 millimetres in diameter, with a short point, without a stylet. This is pushed through the cheek below the

zygoma, on a line joining the ala nasi with the incisura notch of the ear, and about  $1\frac{1}{4}$  inches in front of this notch. If pushed in horizontally the point of the needle will sometimes strike the ramus of the mandible just below the sigmoid notch, but depressing the handle of the needle slightly will allow the point to slip through the lowest level of the sigmoid notch into the zygomatic fossa. Directing the needle slightly upwards and backwards the base of the skull will be reached at a depth of about  $1\frac{1}{4}$  inches, the point of the needle striking the under surface of the great wing of the sphenoid. The handle of the needle must then be depressed and the point of the needle be made to slide along the bone until it engages in the foramen ovale, at a depth usually of  $1\frac{1}{2}$  inches. In some skulls the needle must be directed more upwards, as high as 30 degrees upwards, and in others it must be directed at the same angle backwards. If the needle is pushed in too horizontally the wall of the pharynx will be pierced at a depth of from 2 to  $2\frac{1}{4}$  inches, or again, if it be pushed too far through the foramen ovale, the cavernous sinus and internal carotid artery will be punctured. To avoid this the needle should never be passed through the foramen to a greater depth than  $2\frac{1}{4}$  inches from the surface, even in those cases where it is thought advisable to inject the ganglion itself. If the neuralgia is limited to the third division of the nerve it will be sufficient usually to inject the nerve itself at the level of the foramen, without passing the needle through into the ganglion. Brissaud and Sicard adopt the landmark of the posterior edge of the external pterygoid plate, which will be struck at a depth of about one and a half inches, and then feeling with the point to its upper and posterior edge, when the needle will slip back into the foramen which lies immediately behind it. They also sink the needle in nearer to the zygoma. This line has two disadvantages, as the direction of the needle must be altered after it has been sunk deeply, which is not always easy to do with the fine needle they use, and, more important, the needle is likely to be caught under the pterygo-spinous ligament, and thus prevented from reaching the foramen ovale at all. Sometimes this ligament is completely ossified by a bridge of bone joining the upper and back border of the external pterygoid plate to the spine of the sphenoid, forming a foramen which would be mistaken for the foramen ovale. Indeed, it is clear from their description of their method<sup>1</sup> that they have fallen into this error in at least one case. They recommend a fine platinum needle, of 0.7 millimetre diameter only. I do not find a fine needle nearly so satisfactory as a stouter one, though I do not consider it necessary to use such a stout one, with a stylet, as recommended by Schlösser, and adopted by most of his followers. I find that a fine needle bends so easily that it is quite impossible to be sure that the point of the needle is following the changes of direction given to the handle, and I do not find that the stouter needle causes any more vascular injury than does the fine needle. The internal maxillary artery turns into the zygomatic fossa at the level of the bottom of the lobe of the ear which is well below the bottom of the sigmoid notch, and the only branch liable to injury is the middle meningeal, and the needle should not be directed far enough backwards to damage this vessel.

The *foramen rotundum* is best reached by sinking the needle below the malar bone in front of the coronoid process slightly in front of a line prolonging the posterior border of the orbital process of the malar across the zygoma. The needle should be sunk inwards, backwards, and upwards at an angle of about 40 degrees upwards and 30 degrees backwards. The needle will then strike the anterior border of the external pterygoid plate at a depth of about  $1\frac{1}{2}$  inches, and the point of the needle should then be directed slightly forwards so as to slip in front of the anterior border of this plate through the pterygo-maxillary fissure into the speno-maxillary fossa. Directing the needle at the same angle upwards the point will reach the superior maxillary nerve at its point of exit from the foramen rotundum at a depth of about two inches from the surface, though in the small skull of a woman of the height of 5 feet 2 inches the foramen rotundum will be reached at a depth of only  $1\frac{1}{2}$  inches. It is most important to remember the depth at which the foramen lies as it is not always possible to make the point of the needle engage in the foramen owing to the

backward projection of the antrum in some skulls narrowing the pterygo-maxillary fissure to such a degree that the needle passes in front of the foramen and cannot be made to pass into its anterior lip. If the needle be pushed farther in the same line for three-eighths of an inch the optic nerve will be struck at the optic foramen, and in some skulls it is possible to push the needle straight through the sphenoidal fissure into the brain. When injecting the superior maxillary nerve, therefore, the needle must never be sunk to a greater depth than  $2\frac{1}{4}$  inches from the skin for a large skull, as of a man of 6 feet in height, or more than  $1\frac{1}{2}$  inches for a small skull of a woman of 5 feet in height. If the needle cannot be felt to engage in the foramen rotundum the injection must be made at the required depth, and it is then always perineuritic, the nerve trunk not being actually pierced. Fifteen minims of the strong alcohol slowly injected is perfectly safe from injuring the optic nerve or the third nerve if the precautions as to depth are observed.

Schlösser, Brissaud and Sicard, and all the other users of this method whose writings I have perused use no general anæsthetic, principally for the reason that the patient is able to inform them by a scream of pain when their needle reaches the nerve. In cases of trigeminal neuralgia especially I prefer to perform the injection under general anæsthesia, as thereby perfect stillness of the patient is ensured, and I am not conscious of being hurried, and can therefore perform the injection far better. If the bony anatomy of the parts is thoroughly familiar, as I have already urged to be absolutely necessary, it will be unnecessary to require the information from the patient as to when the nerve is reached, though this sign may be also secured by allowing the patient to come round partially from the anæsthetic after the needle has been inserted and the point is ready to strike the nerve. The patient will then be seen to give a twitch of the face as though in pain, though afterwards no memory of the pain remains.

It is almost needless to remark that the strictest aseptic precautions are necessary. Some advise keeping their needles in absolute alcohol, but I always boil my needles in 1 per cent. bicarbonate of potassium in distilled water immediately before use. The skin is sterilised with ether soap and is then rubbed with a little lysol, which is mopped off with absolute alcohol. The puncture wound is sealed with a small collodion dressing, which may be taken off after the third day.

A certain amount of œdema of the face is constant after alcohol injections, but this is of no consequence and it passes off after two or three days. Hæmatomata sometimes result from puncture of an arterial branch, but I have only encountered this once, when puncture of the infra-orbital foramen when injecting the infra-orbital nerve caused a slight hæmatoma of the lower eyelid and adjacent skin of the cheek.

In conclusion, I am of opinion that this method is a certain relief for trigeminal neuralgia, and though recurrence of the pain is likely after an interval, varying from four or five months to as long as 18 months, it is perfectly simple to repeat the injection whenever necessary. This appears to me far preferable to the more serious operation of extirpation of the Gasserian ganglion, and certainly should at all events be tried first.

In addition to trigeminal neuralgia, this method is of great service in controlling clonic facial spasm, and also other forms of neuralgia, such as post-influenzal supra-orbital neuralgia, the facial pain of inoperable carcinoma of the tongue or jaw, and in chronic sciatica. Tabetic neuralgia affecting the lower limbs and other causes of severe persistent neuralgia below the mid-dorsal region I consider may possibly be also relieved by this method, by injecting the spinal nerves at their point of emergence at the inter-vertebral foramina. These foramina I have found comparatively easy to reach for the lower dorsal, lumbar and upper sacral roots.

Wimpole-street, W.

UNIVERSITY OF BIRMINGHAM: THE FACULTY OF MEDICINE.—The Ingleby lecture will be delivered on Thursday, May 27th at 4 o'clock in the Medical Lecture Theatre by Sir Thomas Barlow, Bart., K.C.V.O., M.D., F.R.C.P. Lond., who will take for his subject Raynaud's Disease and Erythromelalgia.

<sup>1</sup> Revue Neurologique, Nov. 30, 1907.