THE DUBLIN JOURNAL

OF

MEDICAL SCIENCE.

OCTOBER 1, 1888.

PART I.

ORIGINAL COMMUNICATIONS.

ART. XIV.—*On Traumatic Subdural Abscess of the Brain.** By
SIR WILLIAM STOKES, M.D., Ch.M., Univ. Dub.; F.R.C.S.I.;
Surgeon to the Meath Hospital and County Dublin Infirmary;
Professor of Surgery, Royal College of Surgeons, Ireland; Sur-
geon to the Richmond Surgical Hospital; ex-President, Royal
College of Surgeons, Ireland.

A REFERENCE to the statistical records of Abercrombie, Sir William Gull, and Dr. Sutton, will furnish evidence that of cerebral abscesses the traumatic forms are those which occur with least frequency. Thus of eighty-six cases collected by them, only twenty resulted from injury, or less than one-fourth the entire number. Of these the subdural are the rarest, and it is to this form that I desire particularly to invite attention.

Until comparatively recently cerebral abscess has been considered, as a rule, a necessarily fatal condition. Undoubtedly high authorities such as Abercrombie, Griesinger, Lebert, and other accurate and trustworthy observers regarded them as out of the range of practical medicine, and the fact that this hitherto hopeless condition has of late to so great an extent been rescued from the confessed impotence of medicine, must be regarded as not the least among the modern triumphs of surgery. Two circumstances have doubtless conduced to bring about this desirable result: one, the greater knowledge that has been recently acquired of the localisation of

* Read before the Section of Surgery of the Royal Academy of Medicine in Ireland, February 24, 1888.

cerebral function, injury, and disease, and the other, the application of the principle of antisepticism, which deprives to so large an extent surgical operative interference of so many of its risks and dangers. The surgeons' hands are no longer, as was formerly the case, weakened and paralysed by the dread of meningeal or encephalic trouble resulting directly from the operation of trephining.

It must be admitted, I think, that the advantages to be derived from trephining in cases of cerebral abscess are more likely to be conspicuous than when the operation is performed for other conditions causing pressure. I allude more particularly to those cases in which it is produced by some solid tumour or is hæmorrhagic in character. The facilities for localising abscess are, as a rule, greater than in these cases, and there is less risk of the subsequent occurrence of secondary complications at a period more or less remote from the time of the operation.

The cases of subdural traumatic cerebral abscess that have been operated on have been comparatively few. I have, in fact, ascertained only eleven such, operated on respectively by Dupuytren, Roux, Cæsar Hawkins, Rentz, Hulke, Sir J. Paget, Marshall, Lee, Macewen and myself. Of these eleven cases it is interesting and encouraging to note that in five the recovery was complete; in one there was recovery, but with loss of sight and a subsequent tendency to epileptic seizures, leaving only five out of the eleven in which the operation was unattended with success.

The rarity with which the operation has been undertaken has, doubtless, to a large extent been due to the difficulties, now happily diminished, of localisation, and also to a lack of confidence in dealing surgically with such conditions which of late years we have obtained from a clearer and more thorough appreciation of antisepticism. In opposition to this, however, it may be said that perhaps the most brilliant instance on record of successful operative efforts in a case of traumatic cerebral abscess occurred in the pre-antiseptic era. I allude to the case operated on by Dupuytren, whose bold interference, notwithstanding its successful issue, has been thoughtlessly described as reckless and hap-hazard. For example, Mr. Lawrence^a observes, in reference to cerebral abscess, that "surgery, speaking through Sir A. Cooper and Sir B. Brodie, declares itself as impotent as medicine for the cure of such a malady, for although it is recorded that on one occasion Baron Dupuytren actually punctured the brain to the depth of an inch, after which the patient recovered, the result

^a *Edinburgh Medical Journal*, 1869.

must be regarded more in the light of a specially lucky chance than as constituting a precedent which would warrant a like procedure in similar circumstances." Dupuytren's operation would, in truth, be more fittingly described as one suggested by a surgical genius such as few, if any, have ever before or since possessed.

In connection with the subject of cerebral abscess, the two following cases, which were under my care in the Richmond Surgical Hospital, are noteworthy examples; and the details connected with them, taken with the others to which I have already alluded, will, I trust, aid in arriving at some definite conclusions which possibly may guide us in our future appreciation and management of similar cases. The majority of them, I may mention in passing, are signally illustrative of the pathological fact, first noted by Dease, in reference to the usually late appearance of cerebral trouble after cranial traumatisms:—

CASE I.—The first of these cases occurred in the autumn of 1869. The patient, a strong, powerfully-built young man, aged twenty-six, was admitted into the Richmond Surgical Hospital, under my care, in September of that year. He had gone to the North of England during the summer to obtain employment at harvest operations, and during a dispute with some of his fellow-labourers, received a blow on the side of his head, over the left temple, with the handle of a reaping-hook. He was stunned by the blow, but soon recovered, and no other immediate bad consequence of the injury occurred. For some weeks after this he was able to continue his work, suffering from nothing but occasional headaches. He then returned to Ireland, and shortly after landing on the quay at the North Wall, got, it was said, a "weakness." He fell and became insensible. He was then brought at once to the Richmond Hospital, and I was promptly summoned. I found the patient in a state of complete insensibility; myosis extreme, and pulse slow. He had retention of urine; his respiration was not stertorous, however, but the paralysis, motor and sensory, was complete. Shortly after his admission into hospital, assisted mainly by my friend the late Dr. Henry Curran, I trephined above and behind the left temple, at the situation of the cicatrix. On removing the bone there was a distinct bulging of the dura mater through the opening. I made an incision into it and evacuated about a drachm of clear, straw-coloured serous fluid. There was no appearance, however, of pus, which was, I need hardly say, a source of great disappointment to me. It was remarkable, however, that even the relief from pressure obtained by the trephining and evacuation of a small amount of serous fluid was sufficient to restore a certain amount of sensibility, as was evidenced on touching the conjunctiva. The operative measures I adopted in this case did not

go any further, and the patient was removed to bed. The following day he died. At the autopsy an abscess containing fully two and a half or three ounces of healthy cream-coloured pus, and lying directly under the dura mater, was found situated immediately behind the situation where I trephined. Had I gone the twentieth of an inch further back I should unquestionably have opened the abscess.

This case, I need hardly observe, occurred in the pre-antiseptic and pre-aspiration era, and I had not the confidence that the one and the assistance that the other now affords; but, persuaded as I was that I had to deal with a case of intracranial suppuration, it will ever be a source of regret to me that I desisted from the course to which I was instinctively prompted—viz., to make a second, or if necessary a third, trephine opening. All the probabilities are that had I done so the matter would have been reached, and the patient's life possibly, indeed probably, saved.

In the following case the operation of trephining was attended with a more satisfactory result:—

CASE II.—John Brophy, aged twenty-four, by occupation a wall-plasterer, was admitted into the Richmond Surgical Hospital on July 29th, 1887. At the time of his admission he was in a heavy drowsy condition. Between six and seven weeks before his admission into hospital, he was, on a Saturday night, during a dispute with some companions, struck on the head with a poker. For a small scalp wound, which apparently was the only injury which resulted from the blow, he went to Jervis-street Hospital, where the wound was dressed. The patient was not detained in hospital, and on the following Monday morning went to work as usual. He continued at his employment continuously until July 17th, but for some days before this his appetite had been failing and he had been feeling rather sick and drowsy. He complained also of dizziness. On the night of the 17th he was attacked with vomiting, which continued off and on for a week. Shortly after this it was observed that he had considerable difficulty in speaking and making himself understood. He was admitted into hospital on July 29th, and his condition then was as follows:—There was a small wound not quite healed at the upper part of the forehead, about an inch to the left side of the mesial line. On passing a probe into this, denuded bone could be felt, and apparently a slight depression. The patient was extremely drowsy, and when sitting down at once fell asleep, but could be aroused by being spoken to in a loud voice. He answered, however, only in monosyllables, and could make no attempt at describing either what had happened to him or what he was suffering from. His pulse was 42; respiration and temperature normal; pupils even, but contracted. On the 31st his condition was

much worse; he could be roused only with the greatest difficulty; his water was passed involuntarily, and paralysis in the extremities, both of motion and sensation, was well marked; his breathing, however, still remained normal, no evidence of stertor being in the slightest degree present. Power of deglutition, too, was found at this time to be lost, and as the day wore on, the stupor, from which it was found perfectly impossible to rouse him, became more intense. At 2 o'clock, p.m., he got a convulsive seizure, confined to the right side: the leg and arm were rigidly extended, and the hand strongly clenched with the thumb turned under the fingers. These convulsive seizures lasted about three minutes, during which the pulse rose from 40 to 100, and the respirations became rapid, reaching 30 in the minute; the pupils contracted to pins' points; the cornea perfectly insensible, and the forehead bathed in perspiration. On the convulsion ceasing, it was found that it could be reinduced by tickling the soles of the feet, an experiment which was, in consequence, not repeated.

The case was clearly *in extremis*, and although I considered the chance of relieving the patient by operation was, under the circumstances, a remote one, I deemed it possible that relief might be afforded by trephining, and that the operation should be performed without delay. In this view I was strengthened by the coinciding opinions of my colleagues, Drs. Thomson and Corley, who examined the case with me, and subsequently assisted at the operation.

At 5 30 p.m. I operated, and on raising a triangular flap of pericranium over the situation of the wound I found that there was no fracture with depression, but a small piece of the outer table of the bone was necrosed and completely detached. This, acting as a foreign body and source of irritation, had doubtless prevented the external wound from closing. Having removed the detached fragment, I next applied the crown of a trephine so as to include the situation where the loosened piece of bone had been found. On raising the bone and exposing the dura mater no evidence of abscess was found. Feeling confident, however, I could not be far from the source of pressure, I punctured the dura mater with the needle of a hypodermic syringe, and passed it down for about the eighth of an inch, and on drawing up the piston of the instrument experienced disappointment at getting a negative result. I then passed the needle still deeper, and again failed to reach the matter. I was about to withdraw the instrument and abandon my efforts to relieve the patient, when, strengthened by the concurrence of my colleagues, I sank the needle down as far as it could go. On drawing up the piston once more I gladly perceived a few drops of pus in the glass receiver. I then freely opened the dura mater, and using the needle as my guide, I passed the blade of a narrow bistoury down to the abscess, some of the contents of which appeared soon at the surface of the wound. Acting on Mr.

Thomson's suggestion, I got a piece of India-rubber tubing, and passed one end down to the abscess, and attaching the other to the nozzle of a medium-sized glass syringe, I succeeded in drawing or pumping up a quantity of dark-coloured grumous pus. Of this I obtained one ounce and two drachms. I then filled a glass syringe with a one per cent. solution of carbolic acid, and thoroughly washed the abscess cavity, removing subsequently the carbolic solution by drawing it up in the way I had done with the pus. A drainage-tube being then left in, I replaced the flap, uniting the edges with numerous catgut sutures, and dressed the wound with sal-alembroth gauze and iodoform wool.

As regards the situation of the trephine opening, I may mention that it was three-quarters of an inch to the left of the mesial line, and one inch in front of the coronal sutures. It corresponded to a point between the supero-and meso-frontal convolutions. In order to ascertain the size and direction of the abscess cavity I passed my left little finger into it; I could determine its limitation anteriorly, laterally, and inferiorly. Externally and inferiorly its limitation must have been formed by Broca's lobe, but posteriorly and inferiorly, although I passed my little finger as far as possible, its limit was not reached, and my belief—one shared in by Professor Cunningham—is that the abscess possibly involved the lateral ventricle.

The beneficial effects of the operation were almost immediate. His pulse from being 40 per minute rose to 120; he opened his eyes and looked about intelligently. After the wound was dressed he made an attempt to speak, and when asked if he felt better, answered, with tolerable distinctness, "Yes." In about half an hour I removed the patient to his ward, and for some hours he remained on his back quite quiet, the only disturbance being to make him take, from time to time, some warm milk, which we found him able to swallow without difficulty. Towards evening he turned on his side of his own accord and fell into a quiet sleep. In this condition I found him on making my visit between 9 and 10 p.m.

The next morning the patient was able to talk quite clearly and rationally; he passed water of his own accord. I dressed the wound, but did not remove the drainage-tube; the patient's condition was in every way most satisfactory. On the day following, there being no discharge through the dressings, and the pulse and temperature being all that I could desire, I left the dressings undisturbed. The patient's bowels moved quite naturally. From this time the progress of the case towards recovery was uninterrupted. On August 6th I removed the drainage-tube, the wound, except at the point where the tube had been, being completely healed.

On August 13th the patient was up and able to walk about the ward, free from all pain and feeling quite strong. Shortly after this I trans-

ferred him to the House of Rest at Merrion, where he remained for five weeks, at the end of which time he was able to return to his usual avocation. The final outcome of this remarkable case, if disappointing, is of much interest. For nearly nine months after the operation the patient remained perfectly well, and quite able to follow his usual occupation as a wall-plasterer. It was then stated that he got a "fit," from which he recovered, and he returned the following day to his work. The morning after this he was found in bed in a state of complete insensibility, and he was then brought for the second time to hospital. Right hemiplegia was complete, and both plantar and patellar reflexes were lost; his face was pale, but lips deeply cyanosed. Pulse, 160; respiration, 60; temperature, 101·8°. He had frequent convulsive seizures after he came to hospital.

Thinking it possible that these symptoms might be due to the formation of a second abscess, I reflected the flap I made originally at the trephining operation, and, on opening the dura mater, through some thickened cicatricial tissues, gave exit to a quantity of bloody serum; I then passed a blunt-pointed director downwards and backwards to a distance of 5 cms., but did not reach any pus or other fluid. A director was then passed downwards and slightly forwards, when a considerable quantity of serous fluid came gushing out. From this situation I removed six drachms of sero-sanguineous fluid, dotted with white-coloured flakes. The effect of the operation was to reduce the pulse from 150 to 100, and the temperature from 105·1° to 104·6°. The patient, however, never rallied, and died the day following.

Before attempting to draw any conclusions in reference to the signs and symptoms of traumatic cerebral abscess, it would be desirable to take a survey—which must necessarily be a very rapid one—of the other similar cases to which I have already alluded. The first of these I would mention is the well-known case described by Dupuytren, one remarkable in many ways, but more particularly from the great and exceptional length of time that elapsed between the receipt of the injury and the development of signs of cerebral pressure. The patient was a young man, who was struck on the top of his head with a knife which broke, and a portion of it remained in the perforating wound. This healed, and all went on well for several years, save some occasional pains about the scar. Symptoms of compression suddenly supervened, and he was brought into hospital in a state of stupefaction. Dupuytren ascertained the existence of the foreign body under the scar, and trephined, but without relief. The dura mater was then opened, a deep incision made, and the contents of a large abscess evacuated. This brilliant operation was followed by complete recovery.

In reference to the great length of time that in Dupuytren's case elapsed between the receipt of the injury and the symptoms of brain pressure from abscess, I may mention that another case—one, however, which was not operated on—has been recorded by Mr. Lawrence, in which the injury of the head preceded the death of his patient from abscess in the brain by almost five years.

M. Roux published a case in which, after trephining, he opened the dura mater, but with a negative result. He proceeded no further, and the patient died. The autopsy revealed a large abscess below and behind the spot trephined, immediately under the cortical substances of the brain.

Mr. Cæsar Hawkins has also recorded an instance of subdural cerebral abscess, in which the symptoms did not manifest themselves until a month had passed from the date of the injury. After trephining, the dura mater was found in a sloughy state, and a large opening in it, through which escaped a quantity of matter. The patient died five days after the operation, and an abscess was found on the back part of the left hemisphere, reaching down to the left ventricle, into which it had nearly opened.

A case of cerebral abscess, resulting from a gunshot injury, is recorded in the *American Journal of the Medical Sciences*, by Drs. C. Fenger and E. W. Lee, of Chicago. The ball did not penetrate the cranium, but fractured the margin of the orbit, and passed upwards and outwards for two cms. Here it lodged, and was cut down upon and extracted. In a *précis* of the paper by my colleague, Dr. Thomson, in the *Dublin Journal of Medical Science*, 1884, it is stated that in forty hours the patient had intense headache and pain in the orbit, he vomited, had some exophthalmos, and there was loss of vision. The fracture was then exposed, some bone removed, and a small abscess in the orbit evacuated. A month after the injury he was able to leave the house, but he soon felt faint, and had to return home. A day later he became drowsy, with a pulse of 54, and finally comatose. The temperature was normal; there was no paralysis.

In this case trephining was performed, the dura mater opened, and a succession of punctures made in different directions and of varying depths before the matter was discovered. It was found at a depth of two and a half inches; about an ounce and a half of pus was withdrawn. A week subsequently the patient again became comatose, and the operation was repeated, this time the needle being inserted to a depth of fully three inches, when a small

quantity (about half a teaspoonful) of thick yellow pus was removed. In seven weeks from this time he resumed his duty as a policeman. Some months later, in July and again in December, he had epileptic seizures, but it was not stated whether he remained liable to these subsequently.

A remarkable, and, as far as I can ascertain, the first, case in which exploration and aspiration were employed in dealing with cerebral abscesses was a case published by Rentz, noted in Fenger and Lee's paper,^a in which aspiration was performed in a case of cerebral abscess twice daily for a period of twelve weeks, with complete ultimate recovery. The abscess was the result of a punctured wound inflicted with a knife, which, as in Dupuytren's case, broke, and the point was left impacted in the tissues. The wound was over the right frontal region. Eleven days subsequently to the receipt of the wound, symptoms of cerebral pressure having set in, the wound was reopened and the point of the knife extracted. This was followed by the escape of foetid matter. In this case trephining was not had recourse to, but the abscess was evacuated by aspiration through the wound, the operation being performed twice daily, this treatment continuing for the protracted period of twelve weeks. The result in this case was in every way satisfactory. There was no definite proof that the abscess was subdural, but from the account given by Rentz he was obviously of opinion that the abscess was one involving the brain substance.

For the purposes of exploration Rentz has recommended blunt-pointed needles as being less likely to injure the blood-vessels during their passage through brain tissue. The suggestion is, I think, a sound one, and deserving of adoption.

Mr. Macewen, of Glasgow, has had considerable experience in both epidural and subdural cerebral abscesses, having seen ten cases. Of these six were operated on, with three recoveries, of which only one, however, had a distinctly traumatic origin. The particulars of this case have not as yet been published, but Mr. Macewen states that the cerebral abscess showed itself a fortnight subsequently to the receipt of the injury, and was attended with the usual signs indicative of brain pressure. It was not situated below the wound, and its presence and position in the brain had to be determined by the exhibited symptoms.

In the "Medico-Chirurgical Transactions" for 1879, Mr. Hulke has published a case of traumatic cerebral abscess. The patient was

^a American Journal of the Medical Sciences, July, 1884.

an errand boy, aged fifteen, who, hurrying out of a factory, stumbled against an iron fence by which his forehead was grazed; he was stunned, but soon recovered. For a month he remained at his employment, and then began to be troubled with nausea, and soon after to vomit occasionally. On admission into hospital five weeks after this injury, the symptoms were considered indicative of intracranial inflammation. The following day incomplete hemiplegia was observed, and this, with the other symptoms present, enabled Mr. Hulke to diagnosticate cerebral abscess. Trephining was performed, and a fine trocar pushed through the membranes into the brain; when at a depth of about an inch some thin greenish pus rose into the syringe. A free opening was then made with a narrow knife along the trocar, and a considerable quantity of pus evacuated; the hemiplegia and retching ceased immediately after the evacuation of the abscess. Although the boy's life was unquestionably saved by this operation, still the result of it cannot be said to have been satisfactory, for ultimately the patient became blind and subject to epileptic seizures.

Sir James Paget^a and Mr. Marshall^b have each published a case of traumatic cerebral abscess, in which they performed the operation of trephining. The result, however, in neither case was satisfactory, owing doubtless to the fact that the former was one of multiple cerebral abscess, and the other one of extensive meningeal inflammation and diffuse suppuration.

Among the points in these cases which are of special interest and deserving of consideration are—first, the ætiology of such cerebral abscesses, and also the remarkable latency of the symptoms usually connected with them. The two cases I have recorded in this communication do not—owing, doubtless, to the paralysis in both cases having been so profound—throw much light on the subject of the localisation of cerebral function; a subject which at present is so largely exercising the surgical mind. As regards their ætiology, we must, I think, accept the views held by my late colleague, Dr. M'Dowel, and also Sir W. Gull—namely, that the traumatic forms of these abscesses are mainly due to a primary phlebitic condition of the veins of the diploe, which vessels, from their intraosseous position, are specially prone to absorb fluid, and that, as results of this, death of portions of the cranial wall occurs, and ultimately cerebral abscess.

^a Medical Times and Gazette, 1860.

^b Lancet 1857.

The symptoms connected with this condition must necessarily vary much. In the first place they depend largely on the locality in which the abscesses form. Thus it has been pointed out by Huguenin,^a whose remarks are quoted by Dr. J. Burney Yeo in his valuable paper on this subject,^b that when the abscess occurs in the temporal lobes "the difficulty of diagnosis is increased by the circumstance that no bands of fibres which are direct conductors of sensibility or motion pass through this lobe." An abscess, therefore, may attain a considerable size, and may cause general symptoms of compression before any distinct symptoms of disease arouse the suspicion of a localised affection of the brain; and for this reason the acute abscesses belonging to this category in the great majority of cases have not been positively diagnosed.

The latency of the symptoms may be due, therefore, to the occurrence of the abscess in particular situations, or to the brain being able to endure up to a certain point an amount of pressure, when slowly and gradually applied, which, when suddenly received, as in the case of hæmorrhage or bone depression, it cannot tolerate. It seems to be analogous to what occurs in the spinal cord in cases of vertebral caries, and spinal fracture or diastasis. In the former the cord becomes, if I might so express it, acclimatised to the pressure it sustains, consequent on the great, and at times grotesque, alterations in the shape of the column, resulting from caries of the bodies of the vertebræ. In the case of fracture or displacement, however, even when the pressure on the cord is slight, but suddenly produced, the symptoms of paralysis are promptly and distinctly manifested.

From the foregoing observations and cases which I have adduced, the following propositions may, I think, be stated:—

1. That after the primary symptoms of cerebral traumatism have subsided there is frequently a latent period of varying length, during which there are no distinct brain symptoms connected with abscess formations whatever.

2. That their appearance is, as a rule, sudden, and if uninterfered with they run a rapidly fatal course.

3. That the occurrence of pus production resulting from cerebral traumatisms is not incompatible with a perfectly apyrexial condition.

4. That this latter fact will probably aid in differentiating

^a Von Ziemssen's Cyclop., Vol. XII.

^b British Med. Journal, 1879.

traumatic cerebral abscess from meningeal or encephalic inflammation.

5. That both as regards colour and consistence there is great variety in the contents of cerebral abscess cavities, and that, as shown in Wilm's case, published by Rose, of Berlin, they may become transparent.

6. That antisepticism has largely diminished the risks of the operation of trephining.

7. That, having regard to the great mortality of cases of cerebral abscess when uninterfered with—viz., from 90 to 100 per cent.—the operation is indicated even when the patient is *in extremis*.

8. That, in the case when the trephine opening does not correspond to the situation of the abscess, exploratory puncture and aspiration may be employed.

9. That by the adoption of this measure the necessity for multiple trephine openings can be largely obviated.

10. That the employment of a blunt-pointed aspirating needle, as suggested by Rentz, is probably the safest mode of exploration and evacuation.

11. That drainage is desirable in the after-treatment of such cases.

12. That both during and subsequent to operative interference in these cases a rigid antisepticism is imperatively required.

ART. XV.—*Anæsthetics*. By GEORGE M. FOY, F.R.C.S.I.;
Surgeon to the Whitworth Hospital, Drumcondra.

"Oportet autem neque recentiores viros in his fraudare, quæ vel reppererunt, vel recte secuti sunt; et tamen ea, quæ apud antiquiores aliquos posita sunt, auctoribus suis reddere."

CELSUS—*De Medicinâ*.

MEDICAL historians have much difficulty in accounting for the disuse of anæsthetics at a time when medicine was making such marked progress, as it did under Cheselden, Smellie, and Sydenham. Nor do I find any mention of their use in the works of Thomas Vicary, who might fairly be supposed to know all the principal therapeutic agents of his day.

To-day we can hardly imagine why the preparation of anæsthetics was neglected, and it is still more strange, that surgeons of the repute of Paré and Wiseman are not credited with their use. An