Observations

ON

CERTAIN CEREBRAL LOCALIZATIONS.

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I CONTRIBUTED to the last meeting but one of the Italian Surgical Society some remarks based on my own observations on questions pertaining to cerebral localization, and especially on the importance of the frontal lobes as the seat of the higher functions of the mind. Among other propositions which I then advanced was this, that the surgeon could contribute more effectively than the physiologist to the conception of cerebral localization in man. The former when compelled to open the skull in order to remove pathological products, sometimes performed true physiological experiments on man.

CASES.

My statistics have now been increased by new observations, and I am glad to be able not only to return with sounder arguments to controversial questions as to the function of the frontal lobes, but also to throw new light on the seat of the cortical centre for hearing, and on that much-debated question the cortical centre for general sensibility. The facts which I shall mention presently seem to me to be clearly proved by the clinical cases which I shall now very briefly describe.

Observation I: Fibro-sarcoma of the Dura Mater Compressing the Left Frontal Lobe: Operation: Cure.—G. B., aged 35, a housemaid, was admitted into my clinic in May, 1884. For a year she had lost the sense of smell and memory, especially for names; she had grown feeble, and her relations stated that her character had undergone a profound alteration; previously lively and vivacious, she had become melancholic and taciturn. For several months she had been very far from using that circumspection and urbanity in conversation habitual to her and to be expected from a respectable woman of her class. On examination we noted the left eyeball was somewhat lowered and turned outwards; choked disc and absolute absence of the olfactory function. The diagnosis of tumour of the left frontal lobe was made.

Operation. May 7th, 1884.—Cranio-resection, with osteoplastic flap by discontinuous osteo-tangential section, and extirpation of a neoplasm, the size of an apple and weighing 70 grams, which compressed the left frontal lobe. On histological examination the tumour was found to be a fibro-sarcoma.

Result.—Complete cure of all the symptoms.

Observation II: Large Subcortical Syphilitic Gumma in the Left Frontal Lobe: Operation: Cure.—S. D., aged 39, a workman, was admitted into my clinic in February, 1896. The disease had begun three years before with pains in the head, at first more intense on the right side; subsequently they became more severe on the left. Large doses of potassium iodide relieved him for some time, then the pains increased in severity, and contemporaneously marked left exophthalmos, with progressive diminution of vision and hearing on the left side manifested themselves. On examination we found left exophthalmos; severe pain referred to the left frontal eminence; left amaurosis; left choked disc; diminished hearing in the left ear; occasional attacks of vertigo; slow perception, confusion of memory, and desire for solitude. Renewed and energetic antisyphilitic treatment having proved useless, we diagnosed a tumour, probably a caseous gumma, of the left frontal lobe, and advised surgical intervention.

Operation. February, 1896.—Cranio-resection, with osteoplastic flap by my method, and removal by the spoon and the knife of a large caseous syphilitic gumma which involved nearly the whole of the left frontal lobe. The histological examination confirmed the diagnosis.

Result.—Complete cure of all the symptoms.

Observation III: Recurrent Fibro-sarcoma compressing the Left Frontal Lobe: Cure.—G. B., aged 46, a housemaid, was admitted into my clinic in March, 1896. She was the patient operated upon by me in May, 1884—that is to say, eleven

years and seven months before—for fibro-sarcoma of the dura mater. After the operation she enjoyed perfect health for six months; then one morning she had an epileptic seizure with loss of consciousness, which lasted for forty-eight hours. A year later she had a second fit, and from that time onwards the attacks manifested themselves with increasing frequency, and were characterized by a cataleptic state of the limbs. The most severe fits occurred at night. On examination, we noted displacement of the eyeball outwards and downwards, and abolition of the sense of smell on the left side. The psychic functions were greatly disturbed; her relations stated that she had lately become extremely religious, her habitual gaiety had given place to sadness, and she had been continually preoccupied and very excitable. For some weeks, however, she had been very melancholic; she was no longer excitable, but, on the contrary, apathetic, and her affective tendencies had acquired a very expansive character. An excessive liberty of speech, little in keeping with her former reserve, was to be observed. Her memory was defective; frequently she could not recall facts and names familiar to her. We diagnosed a recurrent fibro-sarcoma of the left frontal lobe, and advised an operation.

Operation, March, 1896.—Cranio-resection with flap, according to my method. Extirpation of a neoplasm which compressed the left frontal lobe, was adherent to the falx cerebri, and extended downwards to the crista galli apophysis. The tumour weighed 65 grams, and the histological examination showed that it was a fibro-sarcoma. While performing resection of the frontal bone I was able to observe that the bone removed during the first operation was completely regenerated. This proves that I was not mistaken as to the importance of the spiculae of bone which, since 1884, I have left adherent to the pericranium in every cranio-resection that I have performed.

Result.—Complete cure of all symptoms.

Observation IV: Gliosarcoma of the Right Frontal Lobe: Operation: Cure of Defect.—G. B., aged 17, a shoemaker, was admitted into my clinic in March, 1899. The symptoms of the disease began thirteen months previously with an epileptic seizure and loss of consciousness. During the subsequent thirteen months the attacks occurred four times. Five months before mental disturbances manifested themselves, and for four months he had had severe pain in the right fronto-parietal region and vomiting with each exacerbation of pain. For two months there had been rapid and progressive diminution of vision. On examination we noted internal deviation of the left eyeball; paresis of the left facial nerve; a tendency to rotate the head to the right; diminution of the muscular power on the left side; pain on percussion in the right fronto-parietal region; abolition of the knee-jerk and of the upper tendon reflexes; sensibility more marked on the right than on the left side, while in the tongue it was more diminished in the left half; the sense of smell diminished on the left side; choked disc; vision much reduced in both eyes; slowness and difficulty in understanding questions and in answering them; and lastly, absolute indifference to his surroundings. In this patient the alteration in his affective sphere was remarkable; he showed the greatest indifference and contempt for the relations he loved best. We diagnosed a neoplasm in the right frontal lobe, and proceeded to remove it.

Operation, April, 1899.—Cranio-resection with osteoplastic flap by my method. We extirpated a tumour attached to the dura mater weighing 40 grams; it had originated in the cerebral substances of the right frontal lobe, so that this was in great part destroyed. The operation, owing to the free discharge of blood, was very troublesome. The histological examination of the tumour showed that we had to deal with a gliosarcoma.

Result.—Cure of all symptoms, except that vision was totally lost.

Observation V: Gliosarcoma of the Right Frontal Lobe: Operation: Cure with Defect.—G. B., aged 18 years, a shoemaker, was admitted into my clinic in January, 1900. This patient was operated upon by me for gliosarcoma of the right frontal lobe in April, 1899. He enjoyed good health till November of the same year, when he began to suffer from pains in the spot operated upon. In December, that is to say a month later, weakness in the lower extremities, vomit-

ing, and generalized epileptic attacks manifested themselves. On examination we found: diminution of muscular power on the left side; pain in the region of the operation; patellar reflex more active on the left side; complete amaurosis; diminution of hearing in the right ear; diminution of smell; diminution of various sensibilities and of the baric sense [appreciation of weight] on the left. With regard to psychic disturbances we noted on this occasion also that the affective sphere was markedly altered. There was also a complete absence of all deference to the principle of authority. The patient was very insubordinate and made no distinction between his fellow patients and his superiors. The tendency to reduce every answer and every thought to the ultimate expression of ridicule also predominated in him. We diagnosed a recurrent gliosarcoma of the right frontal lobe and decided to operate.

Operation, January 16th, 1900.—Osteoplastic flap by my method. The bone of the former craniotomy had been completely reproduced. Having made the opening in the skull, I saw that the tumour was very vascular. It occupied the whole of the frontal portion of the right hemisphere, and was extirpated by the bistoury and the spoon. During the scraping the lateral ventricle was opened. Being unable to continue the operation owing to the severe haemorrhage, I plugged the cavity with gauze and lowered the flap with the fixed intention of completing the operation at a second sitting. Four days later, having extracted the tampon, I removed additional masses of the tumour adherent to the falx cerebri, and scraped away other masses situated at the base; then with the fingers I enucleated three large nodules occupying the place of the corresponding temporo-sphenoidal lobe which appeared to be almost completely destroyed. The Rolandic convolutions were pushed backwards and upwards, and nothing remained of the frontal lobe but a few remnants of its cortex. The enormous cavity which remained was plugged with a haemostatic gauze tampon. The weight of the neoplastic masses removed at the two sittings was 260 grams.

Result.—Immediately after the operation the patient had complete deafness in the left ear, in which four days later some power of hearing returned. Excepting the loss of vision all the other symptoms disappeared. Seven months after the second operation phenomena appeared in the patient, which indicated a recurrence, and ten weeks subsequently he died in profound coma.

Necropsy.—We found a neoplasm which almost completely replaced the right frontal and temporo-sphenoidal lobes. Of the frontal lobe nothing remained but two-thirds of the cortex of the first convolution and one-third of the second convolution. Of the temporo-sphenoidal there remained only a very small part of its hinder portion.

Observation VI: Reflex Generalized Bravais-Jacksonian Epilepsy from Trauma of the Right Frontal Region: Operation: Cure.—P. L., aged 26, a workman, was admitted into my clinic in March, 1901. Three years previously he had met with an injury to the right frontal region which had caused fracture of the skull with lesion of the soft parts. Two years after this injury he had a generalized epileptic seizure; since then the attacks had become more and more frequent, so that at the time of admission he had as many as nine a day. On examination we found fracture of the skull with loss of bony substance in the right frontal region: diminution of muscular power in the superior extremities; reflexes increased, especially those of the left side. We diagnosed generalized traumatic epilepsy, and decided to operate.

Operation, March 9th, 1901.—Osteoplastic flap after my method. When the opening had been made the dura mater was seen to be opaque, and when incised disclosed the cortex of the frontal lobe softened and of a gelatinous appearance easily removed, as though it were a rosy mucous mass. Having isolated the area of softening, which was of the size of a five-shilling piece, by an incision half a centimetre deep, I removed it with a sharp spoon to the depth of about a centimetre, where the cerebral substance appeared to be of normal consistence. The histological examination of the most consistent part of the extirpated tissue showed destruction of the nerve cells and broken-down gliomatous tissue.

Result.—Complete and permanent cure of all the symptoms.

Observation VII: Large Fibro-sarcoma of the Dura Mater, which directly Compressed the Anterior Half of the two Left

Parietal Convolutions and the Superior and Middle Thirds of the Ascending Parietal Convolution: Operation: Cure with Defect.

—P. G., aged 40, a peasant, was admitted into my clinic on December 3rd, 1899. The disease had originated seventeen months before with weakness of the right limbs, first of the leg and then of the arm; paraesthesia of the whole of the right side of the body, save the arm, manifested itself at the same time. The paraesthetic attacks of which the patient particularly complained had all the Bravais-Jacksonian characters. At first the seizures appeared every two months, later they became more and more frequent, so that at the time of admission they occurred daily. Seven months after the onset of the disease the vision of the left eye commenced to get weak, and a month subsequently that of the right. On examination we found paresis of the right facial nerve and of the right limbs; muscular power diminished on the right side; baric and stereognostic [appreciation of solids] senses abolished; choked disc, and reduction of vision in both eyes; smell weakened on the right side; hearing diminished on both sides, but more on the right than the left; sensibility to thermic and painful impressions diminished on the right; patellar jerks and tendon reflexes of the upper extremities more active on the right; abdominal (epigastric) reflex absent on the right, cremasteric absent on both sides. We diagnosed a neoplasm involving the post-Rolandic parietal region, and in part the ascending parietal convolution.

Operation. December 12th, 1899.—Craniotomy, with osteoplastic flap, and extirpation of a tumour of dural origin, compressing the post-Rolandic region and the two superior thirds of the ascending parietal. The neoplasm was the size of a small orange, and weighed 130 grams. Microscopically the tumour presented the structure of fibro-sarcoma.

Result.—Cure of the paraesthesia, improvement of the paresis.

Observation VIII: Profound Anaesthesia of the Whole of the Left Arm from Traumatic Depression of the Hinder Portion of the Right Parietal Bone: Operation: Cure.—F. G., aged 20 years, a peasant, was admitted into my clinic in January, 1902. About six and a-half months previously he was struck by a stone on the right parietal eminence, and fell to the ground insensible. He was carried to his home, and next day recovered consciousness, but remained for fifteen days completely paralysed both as regards sensibility and motion in all four limbs. On the fifteenth day the paralysis disappeared in both legs and the right arm. The left arm after some time gradually began to acquire motility, but sensibility was quite lost.

On examination we noted depression of the skull corresponding to the right parietal eminence; sensibility to thermic and painful impressions was completely absent in the left arm, as well as the baric and stereognostic senses, so that a pin could be driven to the bone in the forearm without the patient being aware of it. Removal of the depressed bone was advised, and the patient consenting we decided to operate.

Operation, February 15th, 1902.—Craniotomy. Owing to the notable bony depression, its centre corresponding to a point 3 cm. behind the Rolandic sulcus measured by D'Antona's method, I was only partially able to make the osteoplastic flap. Having removed the depressed bony disc, the dura mater was seen thickened, vascularized, and non-pulsating. Having incised and reversed it, I exposed a surface formed of a yellowish, hard elastic tissue to which the dura mater was adherent. Having freed the dura mater from the adhesions with this tissue, which must have been a clot partly organized, the cerebral pulsation immediately manifested itself.

Result.—Complete cure. The sensibility six hours after the removal of the depressed bone was fully restored.

COMMENTARY.

We have here, therefore, eight cranial operations, six for dural and cerebral neoplasms and two for remote post-traumatic conditions with eight cures, of which five are complete and three with defect. Of these eight cases, one (Observation V) died from recurrence after the second craniotomy. The operation in this patient and in the patient affected by complete anaesthesia of the left superior extremity from trauma on the right parietal eminence (Observation VIII) re-

present, as we shall see presently, two true physiological experiments on man.

We shall now consider how far the site of the centre for the psychic functions and that of the cortical centres for hearing and for general sensibility in the human brain can be established by the facts revealed in the eight observations which I have briefly described.

It is well known that the question as to the functional value of the frontal lobes, or better the prefrontal, is still much debated. There are those who hold that the synthesis of all the impressions transmitted by the sensory and sensorial tracts to the brain takes place in the frontal lobes from which synthesis, reasoning, and judgement originate. There are others who believe that this synthesis occurs especially in the parietal lobes.

Bianchi asserts that the frontal lobes represent the more immediate organ of consciousness and of memory, that is to say, of personality in space and time. He arrives at this conclusion on the basis of laboratory experiments and the study of clinical cases; while Luciani and Serpilli attach great importance to the parietal lobes, for in them, according to their observations, the adjustment, combination, and fusion of all the functions of the sensory and sensorial centres of the cortex take place. In fact Raymond maintains that a neoplasm of the prefrontal lobe very rarely remains latent when it penetrates even very slightly into the cerebral substance; because in these cases it nearly always gives rise to psychic disturbances which may take very various forms such as hypochondria, melancholia, mania, paralytic dementia, irritability, etc.

Further, English authors think that the psychic disorders determined by tumours of the frontal lobe present special forms, such as changes of character frequently amounting to real moral perversion, which the English call moral insanity. In my six observations of lesions of the frontal lobes, five of which presented psychic disturbances, the intellectual disturbances had assumed the character of moral insanity in two (Observations I and II). The female patient, on both the first and second occasion, had contracted the habit of excessive licence of language, to such an extent as to make highly improper remarks, and when reproved she not rarely broke into oaths. When she presented herself to me for the second operation, her relatives informed me that for several months she had manifested a peculiar perversion of the moral sense, shown not merely by the use of improper expressions, but by actions void of all decency and absolutely unbecoming an honest woman.

Cases of moral perversion consecutive to tumours of the frontal lobes are referred to by Welt, who concludes that in these cases the disease must involve the orbital surface of the frontal convolutions, particularly the first. This conclusion is remarkably confirmed by the seat of the neoplasm in my Observations I and II. Moreover, Jastrowitz maintains that the particular variety of dementia which the German writers call "moria," and is characterized by the association of mental enfeeblement with a state of gay excitation is met with only in cases of neoplasms of the frontal lobe. Finally, Oppenheim considers madness as one of the possible manifestations of tumour of the frontal and prefrontal lobes.

My Observation II is less important as regards psychic disturbances; in this patient, in fact, there was only slow perception, mnemonic confusion for remote facts, and abolition of memory for recent facts. My Observations IV and V, on the contrary, are highly instructive, since the affective sphere of the patient, on the two occasions when he was operated upon by me, was so much disturbed that he showed the greatest indifference and absolute contempt for the persons he had previously loved tenderly, including his father and mother. Further, he had a singular tendency to make fun of others, and even of himself; he was always insubordinate, and showed little respect towards his superiors. phenomena which completely disappeared after the first and second operations.

Without giving other examples, of which the literature is full, it seems to me that, from the facts cited and from my own observations, I am justified in thinking that when lesions, especially neoplasms, exist in the frontal lobes, the patient—if not constantly, at least in the majority of cases—presents

psychic disturbances. Nevertheless, it is proved by my Observation VI that, notwithstanding the profound degeneration of the right frontal lobe consecutive to trauma, the patient had never had psychic disturbance. This, like many other similar facts, however, makes it necessary to assume the affected frontal lobe directly or indirectly causes a compression of the healthy one, so that it cannot fully take on the supplementary function. This function is performed quite normally directly the compressing tumour is removed, as my first five observations demonstrate, also when, as sometimes happens, we are obliged to remove, together with the tumour, an entire lobe, as is seen from Observation V, which for me has the value of a physiological experiment on the human brain.

Observation V is also important, since it represents another physiological experiment on man, by means of which the seat of the cortical centre for hearing and the relations that the auditory nerves have with the cortical centres of both sides are shown. In fact, during the second operation I was obliged to remove, besides the frontal lobe, almost the whole of the temporal lobe. Now, it turned out that the patient, who before the operation had had only dullness of hearing in the right ear, explainable by the compression caused by the tumour on the right auditory nerve, after the operation remained for three days completely deaf on both sides, owing to the removal of the temporal lobe. Later, the hearing became normal on the right, and remained weakened on the left.

The physiological and clinical data clearly explain this result. Indeed, it is known from the experimental researches of Luciani and Tamburini first, and those of Luciani and Serpilli later, that extirpation of the cortex of the temporal lobe in dogs immediately gives rise to bilateral deafness, which after some days gives place to obtuseness which is also bilateral, more marked, however, on the side opposite to the lesion, for the projection bundles of the auditory nerve are in part direct, in part crossed; but the crossed bundle is much larger than the direct.

Ferrier, likewise, has observed identical facts, while Munk maintains that the cortical centre is unilateral. In my Institute, Roncali has observed experimentally that compression of the parietal lobe in dogs with pebbles produced one-sided deafness on the opposite side to that compressed, and that this disappeared after some days. This fact, he holds, confirms the observation of Luciani and Serpilli with regard to the notable thickness of the crossed bundle as compared with the direct.

Further, we know from clinical experience that in congenital deafness there is absence of the first temporal convolution, and in Bravais-Jacksonian epileptic seizures with initial auditory aura, Wilson, Bennet, and Westphal found lesions of the temporal lobes. Déjerine and Madame Déjerine-Klumpke state that permanent cortical deafness is always connected with bilateral lesions of the temporal lobes, and in particular of the middle part of these lobes. In my case the middle part was evidently injured, since, as I have said, nothing remained of the temporal lobe but a small portion of its hinder part; and in this case the phenomena of absolute deafness which lasted for three days were followed by permanent dullness of hearing in the opposite side, that is to say, in the left ear. This case, therefore, proves that as Van Gehuchten had clearly observed, histologically the bundles originating from the cortical centres for hearing are partially crossed in such a way as to form a chiasma similar to that formed by the bundles which originate from the cortical centre for vision.

It now remains for me to say a few words on the cortical centre for general sensibility, the site and extent of which are, as is known, still much disputed, especially by clinicians and anatomopathologists. Its site is, I believe, clearly indicated by Observation VIII, which for me has the real value of a physiological experiment on man. The patient, as I mentioned, had a notable bony depression corresponding to the right parietal eminence, a depression which by means of the topographical method of D'Antona I was able to convince myself was situated 3 cm. distant from and behind the Rolandic fissure, that is to say, completely removed from the psychomotor zone and well in the parietal lobe. The patient had lost tactile thermic and painful sensibilities in the whole of his left superior extremity, so that he could bear,

with his eyes bandaged, the contact of burning bodies without being aware of them, and permitted needles to be passed through the skin and muscles till their points were fixed in the bone without giving expression to the least sensation of pain. In this patient, moreover, the baric and stereognostic sensibilities were completely abolished. Six hours after the operation all the various profound disturbances of sensibility disappeared as if by enchantment.

I believe, therefore, that I am not mistaken when I maintain that this is the only case existing in the literature which clearly proves that the centre, at least for the superior extremity, for these various sensibilities is situated in the parietal lobe. In fact Déjerine and Madame Déjerine-Klumpke in their recent large and complete treatise on the anatomy of the nerve centres of man in relation to the sensory localizations of the cortex express themselves textually as follows:

Disturbances of the muscular sense are met with contemporaneously in lesions of the Rolandic region and in those of the anterior portion of the parietal lobe; but it has not yet been demonstrated that they can be observed in an isolated state, that is to say, without corresponding motor disturbances consecutive to lesions of the above-mentioned parietal lobe. In other words, there is nothing to show that the cortical sensory zone extends further back than the motor zone. This is a point which requires new researches, and, above all, necropsies made by modern methods, that is to say, by microscopic sections in series.

In my case, above mentioned, the muscular sense was profoundly altered, as is demonstrated by the baric and stereognostic disturbances, notwithstanding that the Rolandic zone was not in the least involved and acted normally.

From the summary exposition which I have given, I believe that I am justified in formulating the following conclusions:

1. That lesions, especially those determined by neoplasms, of the frontal lobes are nearly always accompanied by very grave phenomena of altered intelligence; which proves that the frontal lobes, and particularly the prefrontal, must be considered as the seat of the most elevated functions of the mind.

2. That the cortical centre for hearing is situated in the temporal lobes, that each centre is in relation with both the auditory nerves, and that the direct auditory bundle must be very much less active and smaller than the crossed auditory bundle.

3. That the site of the centre for general sensibility and for muscular sense is in the parietal lobes, and that disturbances of general sensibility and of the muscular sense may occur in the limbs independently of any disturbance of motility whatsoever.

4. That for the solution of various problems concerning the functions of the several regions of the human brain, operative surgery and pathological anatomy are more useful than experimental physiology, which has animals only at its disposal; the functional arrangement of the brains of such animals has some analogy with that of man, but certainly cannot be compared with it in every respect.

A Clinical Lecture

ON THE

ANTISEPTIC TREATMENT OF WOUNDS.

Delivered at the Kgl. Frederik's Hospital, Copenhagen.

By OSCAR BLOCH,

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THE ANTISEPTIC SYSTEM IN DENMARK.

ON the occasion of Lord Lister's jubilee I am honoured by a request to write an article for the highly-esteemed BRITISH MEDICAL JOURNAL. I am delighted to have an opportunity of taking a part in honouring the man to whom the world is so much indebted. I am only afraid that I lack the power of doing full justice to such an opportunity.

As one who studied antiseptic surgery under Lister in Edinburgh some twenty-five years ago, and as one who has since become a professor in clinical surgery, and lectured to students at least once a year on the Listerian treatment of wounds, and who has always mentioned Lister's name when

in the clinic a suitable case occurred; as one who most frequently informed the patients that to Lister they owed their rapid and easy recovery from their illness; as one who has deeply felt the great responsibility Lister has put upon surgeons, inasmuch as they nowadays more than formerly are aware that the life or death of the patient lies to a great extent in their hands, but who, however, never would have been surgeons if Lister had not lived—in short, it is as one of Lister's admirers that I take up my pen to try to honour him.

I feel that I cannot do this in a better way than to repeat the lecture on the treatment of wounds which I was about to give when the request reached me.

Gentlemen,—The patient you now see is a miller, aged 42 years, who was admitted to hospital at 1 a.m. three days ago. He rode home in the electric tram, and on alighting near his home, fell, and sustained a lesion of the right upper extremity. On admission he was somewhat collapsed, but fully conscious. The policemen who brought him here had not applied any temporary bandages. We found that he had a comminuted fracture of the upper arm and a fracture of the ulna. But this was not the worst, for the fractures were complicated—that is to say, there were several, in all, four lacerated wounds which put the fractures into open communication with the air, and besides, the skin was considerably undermined.

It appeared as if the skin had been torn away from the underlying tissues; the deeper portions of the wound were filled with blood and street dirt. We convinced ourselves that there was no lesion of the great vessels, and so decided not to amputate. We cleaned the arm, we rinsed the wound very carefully with 3 per cent. carbolic acid; we were compelled to dilate the wound and make counter openings to thoroughly clean it; we then put in five drainage tubes, and covered the whole with sterile "hydrophil" gauze previously treated with 3 per cent. carbolic acid; this was made fast, and bound over with sterile "hydrophil" gauze; over this thick layers of "hydrophob" cotton wool, which entirely covered the edges of the underlying gauze, were placed, so that the gauze was entirely covered up by the cotton wool. The entire dressing was fixed with an ordinary gauze bandage, and by means of cardboard the upper extremity was immobilized in an extended position, and then elevated at a proper angle.

He soon recovered from the effects of this extensive treatment, and now, when three and a-half days have elapsed since admission, the highest temperature he has had was yesterday evening (38.7° C.).

As we are now about to change his bandages, and to see if we have acted aright in endeavouring to save his arm, I have thought that it would be well to take this opportunity of showing you the patient, and to add some observations on wound treatment, for, as you know, it is such treatment that, before everything, dominates the surgeon's practical occupation.

You have often heard me say that it is much more difficult to be a good antiseptic surgeon than a good operator. Now we take off the bandages. You see that the outer bandage is in several places soaked with wound secretions, mostly blood. It does not smell sweet. You will observe that this secretion has come from underneath the cotton wool and therefrom has diffused through the "hydrophil" gauze. The wool itself is entirely free from secretion. We now remove it. It does not show, at any point, that it has absorbed any secretion. It is because it is "hydrophob," namely, water turning. From the wool the fat has not been removed; it is brown, because the fatty substances have become darkened by the sterilization at 120° C. Under this wool we note the thick dressings, the "hydrophil" gauze (and the layers are certainly thick); all this gauze is filled with the wound secretions, mostly blood, but it is so dry that it is rather stiff. However, it can easily be removed from the skin. We now see a little uncongealed blood issuing from the drainage tubes. It looks quite healthy, and does not smell at all. We take out one of the drainage tubes, and in a sterilized glass examine a little of its contents which appear to consist of freshly coagulated blood. It will later be submitted to bacteriological examination. Now we have the whole arm before us. What we feared—and this was the cause of the redressing so early as to-day—that gan-