The first primary brain-tumor operation

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On November 25, 1884, Mr. Rickman J. Godlee performed the first recognized resection of a primary brain tumor. This operation was carried out at the suggestion of Dr. A. Hughes Bennett, a neurologist at The Hospital for Epilepsy and Paralysis, Regents Park, London, England. Other operations for intracranial tumor had been performed but were for extracerebral meningeal or osseous tumors. The “first” operation for a primary cerebral tumor by Godlee was meticulously described and well documented in the medical and popular press of the day and stimulated both professional and lay discussions of the topic that directly and indirectly led to further surgery on the cerebrum itself and the advent of modern neurosurgery. The original patient of Mr. Godlee died on the 28th postoperative day of apparent meningitis and secondary complications, but postmortem examination revealed no remnant of the excised glioma.

KEY WORDS • brain tumor • surgical management • neurosurgical history

"An Idea Whose Time Has Come"
—Victor Hugo, Histoire d'un Crime, 1852

Medicine in late Victorian England ranked among the best in the world, but was still as much art as science. Instruments were crude, medications were impure mixtures of herbs and extracts, and proper diagnosis rested as much upon experienced intuition as on a knowledge of the pathophysiology of a given condition. Operations for skull or meningeal tumors had been performed previously but only on the basis of easily recognized skull deformities or exostoses. Localization of intrinsic cerebral neoplasms on the basis of neurological symptoms and signs was relatively unknown.

Nonetheless, significant strides in neurology and neurophysiology were being made by a few key people working quietly in their laboratories. Paul Broca and Hughlings Jackson revealed that certain areas of the brain are related to different areas of body function and that, conversely, certain body symptoms could be used to trace back the origin and location of pathological conditions in different areas of the brain. David Ferrier confirmed these clinical hypotheses in the laboratory animal. The stage was set.

Case Report

On November 3, 1884, a 25-year-old (right-handed?) Scottish farmer was referred for evaluation to The Hospital for Epilepsy and Paralysis, Regents Park, London, because of paralysis of the left hand and arm. The patient was admitted and evaluated by A. Hughes Bennett, M.D., who was “Physician to the Hospital” at this time. The patient’s history appeared unremarkable, and he had always been in good health. Note was made of the fact that he had “never suffered from syphilis or a day’s illness of any kind in his life.” There was a history of head injury 4 years prior to that time, when he was struck on the left side of the head and temporarily concussed, after which he recovered uneventfully except for “occasional slight headaches.” The patient remained in good health for a year and then began to develop intermittent twitching of the left side of his mouth and tongue. This then progressed to periodic focal motor seizures (or “attacks of a paroxysmal character” as they were described at the time), involving the left side of his face and tongue, followed by turning of his head to the left side. The “peculiar feeling” or paresthesia ran down the left side of his neck to the arm and leg and then culminated in loss of consciousness and a generalized motor seizure. For 2½ years the patient was subject to daily recurrences of the focal motor seizures on the left side of his body, and also less frequent generalized convulsions, beginning with the minor focal events. The seizures began to involve the upper limb as well as the face 6 months prior to admission. The patient developed progressive weakness of the left upper limb which worsened to total paralysis. Interestingly enough, after the upper limb began to be affected there were no
further generalized convulsions. In August, 1884, the patient's weakness was so severe that he had to cease working. He was also said to "walk a little lame."

Initial physical findings by Dr. Bennett were reported to be normal except for: frequent complaints during the examination of attacks of lancinating pain in the head, a poorly defined area of sensitivity to deep palpation in the right parietal area, bilateral "optic neuritis" with "small hemorrhages" on the right side, a mild left facial paralysis, protrusion of the tongue to the left side, slightly decreased hearing in the right ear, complete left upper-limb monoplegia without atrophy, left-sided hypothermia of the skin, partial left lower-limb monoparesis, limping gait, and left-sided hyperreflexia. No sensory abnormalities were noted.

The patient was admitted to the hospital and continued to complain of "paresis and attacks of lancinating pains in the head." These pains lasted up to 12 hours and were frequently so violent as to cause the patient to become delirious and "keep the whole ward disturbed with his cries."

Dr. Bennett wrestled with the diagnosis and location of this lesion and undoubtedly discussed it with his associates, quite possibly including Hughlings Jackson and David Ferrier. The patient was initially treated three times daily with bromide and iodide of potassium, 20 grains each, as well as ice packs to the head, but with minimal benefit. He was given intermittent hypodermic injections of morphine which seemed to help the pain somewhat.

It was finally believed that the only hope of treatment and ease of the patient's symptoms was a surgical operation, despite the fact that this had never been done before to the knowledge of the physicians. In the words of Dr. Bennett:2

"The terrible sufferings of the patient rendered life intolerable to him. All remedial measures having failed, and as it was obvious that his symptoms were extending, and that a fatal termination was not far distant, it was determined that an attempt be made to remove the morbid lesion. It was hoped that even if such a proceeding was not permanently successful, it might alleviate some of the more pressing symptoms. The novelty and risks of the proposed treatment having been fully placed before the patient and his friends, they readily consented to the adoption of any measures which offered any prospects of mitigating the urgent distress or of averting a certain death."

Dr. Bennett decided that the lesion lay somewhere over or in the right precentral gyrus and used various external lines and angles to calculate the location of this lesion. Mr. Rickman J. Godlee (Fig. 1), a junior surgeon at the University College Hospital, was called in to perform the surgery.

The operation itself was performed at "the Hospital at Regents Park," (Fig. 2) a small, three-story house which was first renovated and converted to a hospital in 1873. (This building was subsequently destroyed and its exact location is not now known.)

Despite the rather inauspicious location and surroundings, this operation was not performed in total obscurity or neglect. It seems that bystanders and observers of the operation included not only Dr. Bennett, but also Hughlings Jackson, David Ferrier, and Victor Horsley.14,22

Rickman Godlee was the nephew of Sir Joseph Lister and followed what must have been the best antiseptic technique of the day. The scalp was shaved and then soaked with carbolic acid (phenol) lotion. The upper portion of the body was surrounded by "carbolized" towels. Instruments and hands were soaked in the same solution and a carbolic acid spray was aimed at the field throughout the 2-hour operation. With the patient under chloroform anesthesia, the incision was made over the region, and a 1-inch trephine opening made in the skull. The dura was incised and it was noticed that the brain substance bulged abnormally. For better exposure, second and third trephine openings were made adjacent to the first, and the edges were rounded off with a chisel and hammer. The brain substance was incised with a scalpel for a distance of ½ inch.

A transparent lobulated solid tumor was found and was considered to be "thinly encapsulated but perfectly isolated from the surrounding brain substance." The incision was lengthened and the growth was "easily separated" from the brain substance by means of a narrow spatula. Digital dissection and other instruments were then used to remove the tumor, but "this part of the operation was rendered difficult by the rapid welling of blood into the wound." The remaining cavity was about ½ inches in depth and "of a size into which a pigeon's egg would fit." The hemorrhage was controlled with an electrocautery. The dura mater was then closed with a "a few carbolized silk sutures" and a
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Durante in Italy resected an olfactory groove meningioma in 1885 (although he later stated that it was actually done in 1884). However, this author has found no published or acknowledged account of a prior operation for primary cerebral neoplasm before the account of this operation which quickly spread among the medical community.

The reasons for this apparent delay in operation for primary cerebral neoplasm are probably threefold. First, the science of neurological function and localization was quite primitive, and our current sophisticated diagnostic tools were nonexistent. Second, the principles of microbiology and antisepsis were only beginning to be elucidated, and any operation was fraught with risk of suppuration or sepsis. Third, there was no clinical precedent for operating on a normal-appearing skull in order to manipulate the enclosed brain, and such a bold first step was not easily undertaken by the average (general) surgeon of the day.

The auspicious and monumental exploration into the frontiers of neurosurgery was not undertaken lightly or without much thought and anguish on the part of the physicians involved. In the words of the two main participants (summarizing their paper):

"Such are the main parts of interest and reflections concerning a case which throughout has been a source of great anxiety and responsibility. This has chiefly been due to the fact that we have not had the advantage of any precedent of a like nature to guide us in our methods of procedure. Operations on the brain substance have not been uncommon in the history of medicine, but these have hitherto been performed either for the relief of surgical injuries or for disease indicated by local manifestations. We have nowhere been able to discover the recorded example of a case where a cerebral tumor was diagnosed by the symptoms observed, without visible or tangential external signs, and was in consequence operated on and successfully removed.

In conclusion, we would observe that, although unfortunately in this instance life was not permanently preserved, the experience gained by the case leads us to believe that there is

FIG. 2. The Hospital for Epilepsy and Paralysis, Regents Park, London, where the first primary brain-tumor operation took place in 1884.
an encouraging prospect for the future of cerebral medicine and surgery, and that as a tumor of the brain can be diagnosed with precision and successfully removed without immediate danger to life, we confidently anticipate that under more favorable circumstances the operation will be performed with lasting benefit to the patient."

The first mention of this operation in the scientific literature was an unsigned editorial comment in the Lancet in which the operation was described succinctly, and the comment made that "we need scarcely observe that the further progress of this man will be watched with the greatest interest by all those who appreciate the important physiological and clinical principles involved in the case." Bennett and Godlee then presented this case to a meeting of the Royal Medical and Chirurgical Society on Tuesday, May 12, 1885. The case was discussed by Hughlings Jackson, Professor David Ferrier, and Dr. William MacEwen from Glasgow. Dr. MacEwen called attention to some of his cases in which he had operated for infections of the brain and meninges. Mr. Godlee finished the discussion by commenting on some of the technical aspects of his operation, and apparently believed that he:

"...considered putrefaction would have occurred owing to a certain want of care in cleansing the head before the operation; and, if he had to do the same operation again, he would soak the scalp for twenty-four hours in a solution of corrosive sublimate, and afterwards with carbolic acid; and under such conditions, should not hesitate to undertake a second similar operation."

Considering the technical conditions of the day and the absence of antimicrobial drugs, this pioneering operation went well, technically, and only the infection with secondary brain swelling and tertiary infarction brought about the patient's demise. One can picture the physician and surgeon making frequent rounds to attend this patient and agonizing over his course and the various therapeutic decisions to be made just as neurosurgeons do now over problematic cases.

The operation and reports of it in the medical and lay press aroused considerable publicity and furor. The physician and surgeon were criticized from many quarters, as they had perhaps anticipated. Subsequent eye-witness accounts have suggested that Dr. Bennett persuaded Mr. Godlee, a rather cautious man, to operate on this patient, and the surgeon must have endured considerable soul-searching and self-doubt as the patient suffered through a rocky postoperative course, finally to expire of postoperative complications. (Ironically, Bennett went on to die of a painful and disabling neurological disease in relative obscurity while Godlee's star rose in medical circles steadily thereafter. He was made a baronet in 1912, a Hunterian orator in 1913, and President of The Royal College of Surgeons in 1914. He was named surgeon to the households of three monarchs: Victoria, Edward VII, and George V. He died in 1925, aged 76 years, and was buried in Witchench.)

The London Times commented editorially on the operation, as did an anonymous letter writer to The Times, and this precipitated an outpouring of criticism, substantially propagated and publicized by the antivivisectionist pressure groups of the day. Queen Victoria was herself a known antivivisectionist, and this fact may have fanned the flames of controversy even if she personally had no direct role.

England at this time was at the height of the Victorian era but undergoing a rather painful transition from a rural agrarian economy to an industrialized urban society in which 90% of the population was in the lowest labor class. The average citizen who worked 10 hours a day and 6 days a week probably had little interest in current scientific achievements of the day, and was more concerned about the general economic depression (later called the "slump of the Eighties"). Many citizens were so desperate as to leave the country and it is estimated that nearly one million persons left "The Mother Isle" in that decade.

There was some interest in matters scientific among the upper class although this varied from a few amateur scientists to a large number of the curious such as those who paid to see "The Elephant Man" (a victim of severe neurofibromatosis later popularized in book and movie) on exhibition in public houses and meeting halls. It is likely that only a few members of society took note, let alone an interest, in this landmark operation, but an active group of antivivisectionists took umbrage at this invasion of the human body and the animal experiments that made it possible. However, as a defender of the operation explained in his letter to the editor of The Times, "Many men and women will henceforth, there is reason to anticipate, be safe from prolonged torture and death by a kind of treatment that has been made practicable by the sacrifice, under anesthetics, of a few rabbits and monkeys." An observer of the scene later commented that this letter "ignited a controversy which raged in the columns of The Times for 3 months and evoked 64 letters and two brilliant leading articles in support of the scientific position." He "scarcely remembered a nonpolitical discussion in The Times that attracted more attention." However, "Notwithstanding an attack by the antivivisectionists, the new brain surgery made its way."

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