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WILLIAM STEWART HALSTED, 1852-1922

PROFESSOR HALSTED, certainly one of the most cultivated, and regarded by many as the most eminent surgeon of his time, in view of the character of his contributions, died at noon on Thursday, the seventh of September, in the Johns Hopkins Hospital, of which he had been surgeon-in-chief since soon after its opening. At that time, in 1889, neither he nor his clinical colleagues, Osler and Kelly, had as yet turned forty.

A man of unique personality, shy, something of a recluse, fastidious in his tastes and in his friendships, an aristocrat in his breeding, scholarly in his habits, the victim for many years of indifferent health, he nevertheless was one of the few American surgeons who may be considered to have established a school of surgery, comparable, in a sense, to the school of Billroth in Vienna. He had few of the qualities supposed to accompany what the world regards as a successful surgeon. Over-modest about his work, indifferent to matters of priority, caring little for the gregarious gatherings of medical men, unassuming, having little interest in private practice, he spent his medical life avoiding patients—even students, when this was possible—and, when health permitted, working in clinic and laboratory at the solution of a succession of problems which aroused his interest. He had that rare form of imagination which sees problems, and the technical ability combined with persistence which enabled him to attack them with promise of a successful issue. Many of his contributions, not only to his craft but to the science of medicine in general, were fundamental in character and of enduring importance.

As a schoolboy at Phillips-Andover and as an undergraduate at Yale, he was prominent in sports rather than in the class-room, and in

his senior year was captain of one of the early university football teams. Like many other young men his ambition was not fired until his entrance into a professional school, and when, after his graduation in 1874, he entered the College of Physicians and Surgeons (Columbia) in New York, he settled down to prove his mettle with the result that three years later, on getting his degree, he was awarded a prize for leading his class in scholarship. After serving as interne at Bellevue he was appointed house physician to the newly erected New York Hospital. Subsequently, two years were passed in Europe where he devoted himself more especially to the subjects of anatomy and embryology. He studied at Vienna, Leipzig and Würtzburg, and his later surgical trend and investigative proclivities were distinctly colored by the German and Austrian surgery of the day.

On his return from abroad in 1880, he was made assistant demonstrator and subsequently demonstrator of anatomy at the College of Physicians and Surgeons. He also held a number of hospital positions, first at the Charity Hospital where from 1881 to 1887 he was an attending surgeon and director of the out-patient department. For three years he was also surgeon-in-chief to the Emigrant Hospital, Ward's Island; and later, from 1885 to 1887, an attending surgeon to both the Bellevue and Presbyterian Hospitals. During this period in New York, following his return from abroad, he supported himself mainly by teaching, and with Dr. George E. Munroe he organized a famous extramural course for students, consisting of practical exercises in the laboratory and at the bedside, to take the place of the time-honored quizzes which it was long the fashion for the New York students with hospital aspirations to attend.

During his last few years in New York he undertook an anatomico-surgical investigation on the anæsthetizing effect of the then little-known and newly introduced drug, cocaine. In this research, which had been begun in 1885, he was the first to utilize for surgical purposes the principle of nerve blocking, and was accustomed to demonstrate to dentists how painless extractions or even more extensive operations on the jaws might thus be carried out. He was the first, also, at this time, to demonstrate spinal anæsthesia by introducing the drug into the lumbar meninges. In the course of these studies he used himself as a subject, injecting his own peripheral nerves in order to map out the areas of anæthesia, and, unaware of the danger he was running, contracted an habituation to the drug, from which, with the help of a devoted professional friend, he effectually broke himself.

It was natural enough that cocaine was subsequently abhorred by him, and after Schleich's solution came to be generally employed as a local anæsthetic, he usually preferred to infiltrate with salt solution alone, which has certain anæsthetizing properties, rather than use even the diluted drug. Fifteen years later when the writer of this note, as Dr. Halsted's resident surgeon, stumbled anew upon the principle of nerve blocking for operations on hernia and published a paper on the subject, he was utterly unaware that his chief had ever made studies with cocaine of any sort, so reticent was he about this particular matter and so little did questions of priority interest him. It has remained for the dentists to call attention to his original work on regional anæsthesia, and a few months before his death they made due public acknowledgment of what Dr. Halsted himself had never laid claim to, and the knowledge of which he had even withheld, at least until recent years, from his house officers.

Before this tragic episode interrupted what would doubtless have been a brilliant career in New York, he had published a number of papers which showed promise of his technical gifts and abilities as an investigator, but it was not until he was brought to Baltimore in the late eighties by William H. Welch and got to work in the original pathological building there with Franklin P. Mall, Councilman, Flexner and others, that his unusual capacity for research was shown at its full worth.

The studies of compensatory thyroid hypertrophy, one of his early researches, published in the first volume of the Johns Hopkins Hospital Reports, remained for twenty years the

basis of our views regarding exophthalmic goitre as an expression of functional over-activity. The correctness of his observations and interpretation of them, indeed, remained unquestioned until he himself repeated the experiments and, failing to corroborate his original results, promptly reported the fact before one of the biological societies. It was a striking example of his scientific honesty, and it remained for someone else to point out, on the basis of new facts relating to iodine, how it was that his original interpretation had been nearer the truth than his later one.

Another of his early studies was on intestinal resection and suture, and he introduced a method of anastomosis of the bowel, based on the distribution of the blood supply and on the correct placement of the sutures, far superior to that of any of his predecessors. These two subjects, the surgery of the thyroid and intestine, continued to engage his attention to the end, and among his last publications was a monograph entitled "The Operative Story of Goitre" published two years before his death; and another on the bulkhead principle of intestinal anatomosis.

His interest lay not in the number of cases he might operate upon but in working at certain principles of surgery, and in the course of his experiments upon the thyroid and parathyroid bodies, he hit upon what is known as Halsted's Law, namely, that "a transplant of a portion of a ductless gland will survive only when a physiological deficit has been produced."

On the opening of the hospital in 1889 he turned his attention to questions of technique, and was among the first American surgeons to grasp fully the principle of the new aseptic surgery. The introduction of silver as suture material and as a covering for wounds because of its bactericidal qualities was due to him. He studied the healing of an aseptic blood-clot in closed wounds. He introduced gutta-percha in the form of "protective" as a dressing for open wounds. He showed how silk could be safely buried in the tissues, an important principle many surgeons are incapable of learning. He was among the first to insist upon absolute blood-stilling in the course of operations in days when operations were bloody affairs, and he introduced the form of delicate pointed forceps for hæmostosis now universally in use. He also introduced rubber gloves into surgery in the early nineties, and, being himself a painstaking rather than a brilliant or spectacular operator, it was long before gloves came into use in other clinics—indeed, for years they were very much scoffed at as clumsy impediments to manipulation.

His operation for cancer of the breast revolutionized the treatment of these cases, and the same might be said of his hernia operation, though in this he shared the honors with Bassini, an Italian, who introduced a high inguinal operation with repair of the canal at about the same time. In the late nineties his attention was chiefly centered upon the diseases of the gall-bladder and its ducts, and the early radical operation on the common duct emanated from his clinic. Possibly few men in the country knew more than did he about the condition from which he was destined to succumb—a stone in the ampulla of Vater.

In later years he devoted himself chiefly to studies relating to the blood-vessels and evolved a method whereby in cases of aneurysm the major trunks could be slowly constricted, and in this as in all other subjects which his studies illuminated, his inventive genius was displayed, as well as his thorough knowledge of anatomy and pathology. He was the first successfully to ligate the left subclavian artery in its first portion for aneurysm and the only surgeon who is recorded to have performed this rare procedure twice.

Halsted's honors were many. In 1900 at the centennary of the Royal College of Surgeons of England he, with J. C. Warren of Boston, W. W. Keen of Philadelphia, and Robert F. Weir of New York, were the four Americans chosen to receive an honorary fellowship. A few years later he was made an F. R. C. S. of Edinburgh, and also an LL. D. both of Edinburgh and of his alma mater, Yale. Columbia gave him a D. Sc. and he was a member of the National Academy of Sciences as well as of many other foreign and American scientific

bodies. Though his publications were comparatively few—rarely more than one or two a year—he wrote well and painstakingly, and many of his papers will remain among our surgical classics. The one surgeon he perhaps admired more than any other was the late Theodore Kocher of Berne, Switzerland, and the two men, in manner and methods surgical, in imagination and ideals, had very much in common. Both of them held their professorships for an unusual number of years—Kocher for forty-five years, Halsted for thirty-three.

Halsted was a man who taught by example rather than precept. He was a safe, fastidious and finished surgeon, by no means a brilliant and showy operator after the style cultivated by many of his contemporaries. He cared nothing for administration, and up to ten years ago at least, his staff never met as a body. He was not a successful teacher of undergraduates. A bed-to-bed ward visit was almost an impossibility for him. If he was interested he would spend an interminable time over a single patient, reviewing the history, taking notes, having sketches made, carrying the problem to the laboratory and perhaps working on it for weeks. Meanwhile his associates and assistants would run his clinic as best they could. In this way his school developed—none of his pupils after his own fashion, to be sure—it would have been impossible to imitate him—all of them, nevertheless, influenced enormously by his attitude toward surgery, and by his operative methods.

His loss to the Johns Hopkins Hospital which he served so faithfully and long, and to which he bequeathed his property, will be irreparable. It will be equally so to his many and devoted disciples. One of his long series of resident-surgeons, who, as others have done, came to know him better after leaving his service, just as many sons learn to know their fathers not until after they have grown up, has in all respect and affection written this inadequate note of appreciation.

"Who knows whether the best of men be known, whether there be not more remarkable persons forgot than any that stand remembered in the known account of time?"

H. C.

EARTH CURRENTS AND MAGNETIC VARIATIONS

WHENEVER two metallic conductors are buried in the earth and are connected by a wire through a galvanometer a current is found to flow through the galvanometer.

Such a current may be (and sometimes is) caused by a difference of electrolytic action upon, or a difference of temperature of the ground plates, but it is often much stronger than could possibly be produced by such action. It is also regularly the case that the farther apart are the ground connections the greater is their potential difference, and this would not be the case if the currents were due to electrolysis. Since no one has been able to explain these currents by any of the properties of the metallic part of the circuit, it has come to be believed that the currents are flowing in the earth before the two ends of the wire are grounded, and that the wire merely serves as another conducting path between the two earth connections and acts as a shunt for a part of the current. Thus the currents are not regarded as flowing around a circuit consisting partly of the metallic conductor and partly of the earth between its terminals, as they would flow if they were electrolytic or thermo-electric currents, but they are believed to flow in the same direction in both the earth and the metallic conductor.

Since no place has been found, either on land or sea, where these currents will not flow through a long conductor whose ends are earthed, it is believed that there are currents flowing everywhere in the outer layers of the earth's crust and in the sea.

As soon as telegraph lines began to be established it was observed that currents were often set up in these lines when no battery was connected in the circuit. In 1847, a brilliant aurora was observed in Europe and simultaneously with this telegraph lines were greatly disturbed. This led to a careful observation of the diurnal and seasonal variations of the earth currents which were known to be always present in the lines, and to the establishment of a correspondence between these variations and the diurnal and seasonal variations of the magnetic elements of the earth. Since that