

THE EARLY HISTORY OF ABDOMINAL SURGERY IN AMERICA

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The history of abdominal operations forms one of the most interesting chapters of surgery. It is not the purpose of this paper to write it in its entirety, since, treated in detail, it would fill a large volume. It is rather the desire to give a few pen-pictures, chiefly of a personal type, of the experiences of men whom I have known and to show, if I may, the earnest cooperation of a considerable group of America's most distinguished surgeons.

As it is still the custom in some parts of the south, speaking of events transpiring a generation ago, to group them chronologically as happening before or since the war, so we may wisely group the early data into the former period. America is justly credited with the initial step in this new departure of surgery and Ephraim McDowell of Kentucky is properly called the father of ovariectomy. Although this goes back to 1809, it teaches that the world then was not so very large, and the world of thought even smaller, since Dr. McDowell was a student in Edinburgh and carried with him to his then backwoods home the wise training which he received in what was, for a long time, the first center of European medical knowledge and education. In this later day, when specialism thrives in the great centers of population, we often look in vain among the specialists to find the splendid all-around educated men who can compare favorably with the judicial-minded.

self-centered, better type of country practitioners. Such was Dr. McDowell, who necessarily had to do his own thinking; and it is the universal verdict that he did it wisely and well. Such also were the distinguished coterie of his followers, some of whom I had the honor to count as my friends, although they were in their full maturity while I was yet a junior. Thus I knew and loved the Atlees, splendid specimens of manhood of masterly intellect blended with a gracious sweetness and kindness as tender as that of a woman. Gilman Kimball of Lowell, Horatio R. Storer of Boston, and the immortal Marion Sims and Addison Emmet of New York were also among my early masters and life-long friends.

Washington L. Atlee was born in Lancaster, Pa., in 1808 and graduated from Jefferson Medical College in 1829. In an address to the alumni of that college Professor Gross described him when a student as tall, erect and handsome in person, neat in his appearance and possessed with an amount of industry, intelligence and ambition which foreshadowed his future success. Young as he was, he was constantly in search of new truths and devoted to his profession. In a pamphlet published by him entitled "Retrospect of the Struggles and Triumph of Ovariectomy in Philadelphia" he states:

On the 29th of June, 1843, my brother performed ovariectomy. This was the first time that both ovaries were removed. Being associated with him in the case, I commenced studying the literature of the operation and soon realized the bold and important step taken thirty-four years before by McDowell, of Kentucky.

Dr. Atlee operated twice in 1844. The first case, that of a woman of 61 years, proved fatal; the second patient recovered. His third operation, the first case in Philadelphia, was performed in March, 1849. He says, however:

On moving to Philadelphia I found I had roused up a hornet's nest. Ovariectomy was everywhere decried. It was denounced by the general profession, in the medical societies, in all the medical colleges and even by the majority of my own

colleagues. I was misrepresented before the medical public and was pointed out as a dangerous man, even as a murderer. The opposition went so far that a celebrated professor, a popular teacher and a captivating writer, in his public lectures invoked the law to arrest me in the performance of this operation.

The name of Atlee stands without a rival in connection with uterine fibroids. His operations were so heroic that no one has yet dared to imitate him.

He died in September, 1878.

Dr. John L. Atlee shared the honors with his brother. In the discussion of the better methods of treating the pedicle of ovarian tumors (American Medical Association, June, 1876) he advocated the use of the clamp when possible, stating:

I have used the ligature; I have used the hot iron; I have used the needle through the pedicle and walls of the abdomen; I have employed every method of treating the pedicle except pocketing it, and I prefer the clamp. I think the advantage of the clamp consists chiefly in keeping dead tissues out of the abdominal cavity. It fixes the uterus in position. Owing to the relaxed abdominal wall it is not a drag on the pedicle.

I have now operated over 340 times; over 200 times with the clamp with 79 per cent. recoveries.

Dr. Sims objects to the clamp, since it may produce a sloughing of the pedicle and give rise to septicemia; this I have never seen. The pedicle recedes and the wound heals by granulation.

Dr. A. Dunlap of Ohio, a man whom, for his many excellent qualities, I learned to love, and a great admirer of Dr. McDowell, took exception to the use of the clamp, preferring small silk ligatures. He said:

The majority of the patients I have operated on would not have borne to have had the clamp applied putting the pedicle on stretch, since that would have endangered the patient on account of inflammatory action.

He states that he has had 80 per cent. of recoveries with which he has not been satisfied. He obscurely recognized infection and stated that some of his most favorable-looking cases were fatal, but not because of dis-

turbance of the peritoneum. He used drainage-tubes in his most serious cases. He pointed out the increased mortality in patients operated on in large general hospitals and advocated careful exclusion in private wards. He gave the following reason for his objection to the drainage-tube:

The air will pass into the cavity of the peritoneum as readily as the fluid will pass out. Every motion of the diaphragm and abdominal muscles acts like a suction-pump and will draw air into the cavity of the peritoneum alternately with the outflow of the fluid. Blood and bloody serum which without the contact with air might have been safely absorbed, will be more likely to putrefy and thus increase the danger to the patient. In cases, however, in which it has already occurred, the insertion of a drainage-tube is useful in aiding the discharge of the pus and putrescent fluids.

Closely associated with ovariectomy is hysterectomy for the removal of large uterine myomata. Mr. Charles Clay of Manchester, England, is accredited with the first operation deliberately undertaken for this purpose. The patient died two hours afterward from hemorrhage. This was in August, 1843. In November of the same year Mr. Heath operated, the patient's death, attributed to shock, probably from hemorrhage, taking place seventeen hours afterward. The cause of death in both cases was considered to be the division of the pedicle by the knife rather than by *écraseur*. Mr. Clay's second case was in January, 1844. Death, caused by the nurse letting the patient fall on the floor, took place thirteen days after the operation. The first successful case was that of a patient of Dr. L. P. Burnham of Lowell, Mass., who was operated on in June, 1853. After describing the operation in detail, Dr. Burnham said:

I then passed a strong double ligature through the neck of the uterus and tied on each side; then, to make doubly sure against hemorrhage, a ligature was placed around the whole neck. No hemorrhage followed. After the removal of the uterus an examination of both ovaries revealed a diseased condition and they were accordingly extirpated. The abdominal cavity was then carefully sponged and all blood clots removed.

The wound was treated with cold water dressings. Severe inflammation followed with free suppuration. The last ligature came away the fifth week. In all, Dr. Burnham performed fifteen hysterectomies for fibroid tumors with three recoveries. One death was due to hemorrhage. In the light of modern knowledge death in all the other cases was due probably to infection.

Dr. E. R. Peaslev of New York operated in 1853, death occurring on the eighth day from intestinal obstruction—the intestine protruding between the sutures.

More than passing notice is due one of my first teachers, Dr. Horatio R. Storer of Boston. Personally I am under a debt of gratitude to Dr. Storer which can never be paid. We loved him despite the enemies that he made. His equally distinguished father had carefully supervised his education. A graduate of Harvard, a student at law, in due course a doctor of medicine and for four years a sharer in the home and training of the immortal Simpson of Edinburg. As a labor of love for such instruction, he and the late Dr. Priestley of London edited the works of Dr. Simpson in two volumes. Dr. Storer returned to Boston and was appointed an instructor in the Harvard Medical School of the diseases of women. He had a most enthusiastic following when, as an undergraduate, I first met him. He soon became one of the most popular practitioners in the city of Boston and was said to have had the largest income of any member of the profession. He was indefatigable in his work. He founded the Gynecological Society of Boston, the first special society devoted to the diseases of women in the world; and for seven years he published the *Journal of the Gynecological Society of Boston*. The first successful case on record undertaken for the cure of umbilical hernia was one of his early operations. In September, 1865, he successfully performed hysterectomy; and this was the twenty-fourth case of the operation placed on record and the fourth successful case operated upon in America. In 1866 Dr.

Storer contributed an elaborate paper on the treatment of the pedicle of fibroid tumors and strongly advocated the use of the clamp. He devised an instrument which he called his clamp-shield, an instrument capable of producing enormous compression and hinged on a pivot rotating so as to allow closure at any angle. I consider it the best, as well as last contribution for the external treatment of the pedicle by compression.

Dr. Storer made a further contribution, and in my judgment a more valuable one, which he called "pocketing the pedicle." Briefly, it was to suture the stump of the pedicle through and through with the deeper layer of the abdominal wall and thus keep under easy inspection the divided parts. By it he was enabled, in the non-infected cases, to close off the abdominal wall and protect the peritoneal cavity. This was, of course, a step in the direction of aseptic surgery, although taken blindly. There is no doubt that Dr. Storer was the "best-hated" member of the profession in Massachusetts. A long and dangerous illness removed him from the active arena and years were spent in Europe in quest of health, unfortunately never restored fully. He gave brilliant promise of being the leader of gynecology in America, notwithstanding the vituperative abuse unsparingly showered on him by men who should have known better. A generous share of this attention was bestowed on me as his ardent defender. I have somewhere a letter of his, written at the time, containing a touching appeal to forget him and his service to suffering humanity lest it work my ruin. He is a man of strong magnetic power, quick of thought and action, fluent of speech, equally ready to attack his enemies as to defend himself; and there are yet many who hold his service in grateful remembrance.

Dr. Gilman Kimball of Lowell, Mass., continued active until late in life. I saw him operate a number of times when past 70 with his usual skill and ability. I attended him in his last illness; he died when past 80

of hemorrhage from the stomach. He was a man to command attention in any assembly, although modest in the extreme. His abdominal operations totaled about 300. He removed the uterus in fourteen cases with six recoveries.

One of the earliest hysterectomies under the antiseptic method which I find recorded was by Dr. T. G. Thomas of New York, who used his clamp and passed four knitting-needles at right angles through the pedicle to prevent slipping. Although Dr. Thomas called this the antiseptic method, in his report of the case, it may be questioned if infection did not follow, since he states that "the portion of the uterus in and below the clamp entirely sloughed out; the cavity which was left healing by granulations, so that no trace of the organ remained."

About this period Dr. Thomas invited me to New York to see him remove an abdominal tumor and pass judgment on his technic. The tumor proved to be a large multiple cystoma without adhesions and the operation, simple as it was, should have been a brilliant one. All the paraphernalia of the time was in requisition. Two large steam atomizers played constantly on the field of operation. The room was very hot and close. The small pedicle was ligated and dropped within the abdominal cavity. All went to the seeming approval of the select group of distinguished guests. Coming from the operation, Dr. Thomas asked my criticism of the operation, to which I replied asking if he sought compliment or the detection of faulty technic. He answered he hoped the latter. Then I called his attention to the fact that he had taken an unsterilized towel and wiped the perspiration from his face and hands during the operation. The patient died on the third day from infection; and Dr. Cleveland, his then assistant, told me that special preparations had been made in order to show me a faultless technic.

Of the distinguished men who founded the Woman's Hospital of New York and who laid the foundation for abdominal surgery Sims, Emmet and Thomas stand out in bold relief. No men in America have had such splendid following. Sims was the magnetic, dashing Southern leader. Thomas and Emmet were his distinguished lieutenants, equally honored and beloved. The work of such masters is stamped with immortality.

Even the devastating war which, directly or indirectly, brought death, calamity and sorrow into every household of our great country had a fruitage of good. One of these benefits was the resultant better training of the younger generation of medical men in the field and camp. Many of the young army surgeons saw more clearly the need of higher education in their profession and were led to seek postgraduate training, then to be obtained almost exclusively in Europe. The surgical history of the Civil War was written by Dr. George A. Otis, formerly of Springfield, Mass., in a work perhaps unequaled by any American contributor to our literature. It is a mine of information which may be worked advantageously by any seeker of surgical knowledge; and I commend its careful study to those who would be masters of our art. I had the good fortune to begin my study of medicine with Dr. Otis as my preceptor and again to meet him when we were both surgeons in the Union army. He was a Virginian by birth. I sought his instruction on the recommendation of one of the first practitioners, who stated that Dr. Otis was probably the best educated physician in western Massachusetts. He had for a long time been a special student in Paris; for six years a medical editor in Richmond, Va., and later made Springfield, Mass., his home. He was a devout Catholic, fond of music and leader of the choir in his great church and an earnest union man. As a man of wealth he lived generously, his fine estate being nearly opposite the great Springfield arsenal. He appreciated the political situation far more accurately than most men of the north; and when, under the di-

rection of Secretary Floyd, the arsenal was depleted of its hundred thousand modern rifles to stock the storehouses in the southern states, he pointed one day to the long line of teams with their precious freight and said to me, "You men of the North have little conception of the volcano over which you are living." He remained in the service of the United States until near his death, which occurred in Washington. I think he was never quite so happy as when preparing some interesting specimen; and our army museum is the monument of his skill and industry. His voice was soft and pleasing; his southern accent modified by his long Parisian training. He was small in stature, quick in action, and at once impressed himself on those about him as a leader. He collected the records of 3,717 cases of penetrating wounds of the abdomen during the war of the rebellion and gives the ratio of mortality at 87.2 per cent. In 2,559 cases in which visceral injury had taken place 92.9 per cent. died.

In the *Transactions of the American Medical Association* for 1881 my late and beloved friend, Dr. Hunter McGuire, another distinguished Virginian, discussed gun-shot wounds of the peritoneum. He pertinently inquires:

Why are all penetrating wounds of the abdomen, with or without visceral injury, so fatal? Why, when the patient has escaped shock, exhaustion and hemorrhage should peritonitis kill within forty-eight hours? I believe the mortality is often due to some kind of blood poisoning connected with peritonitis just as often we see septicemia associated with peritonitis under other circumstances, notably after parturition and ovariectomy.

He said:

The wound in the abdominal wall should be enlarged or the linea alba opened sufficiently so that the injured parts could be thoroughly examined. Hemorrhage should be arrested. If intestinal wounds exist, they should be closed with animal sutures, first trimming their edges if lacerated and ragged. Blood and all extraneous matter should be carefully removed and then provision made for drainage.

He stated that these were the measures which he advocated in November, 1873, before the Virginia Medical Society. It must be recalled that at that date few accepted Mr. Lister's then novel views of infection, and it remained for Parks and Senn to enlarge on his teachings and engraft the new discovery on Dr. McGuire's urgent advocacy of peritoneal drainage. These three men were active co-workers until so recent a period that they are known to most of our present members. Perhaps less is known, however, of Dr. McGuire, who was a representative of the best type of Virginian. He was the medical director on the staff of General Stonewall Jackson and amputated his arm soon after the battle in which he was wounded. Four days later he died; his death being attributed to pneumonia due to the free use of cold water, but Dr. McGuire later told me that, interpreted in the light of modern knowledge, it was undoubtedly due to wound-infection.

Following the Civil War I was for some years an assistant at the Harvard Medical School and gladly sought the opportunity for further instruction by spending 1869 and 1870 in Europe, for the most part in Berlin. I was well trained in anatomy and I thought I knew surgery. Besides I spent a considerable portion of my time as a pupil of the immortal Virchow in the study of pathology. I first met Dr. J. Marion Sims in Paris only a little before the outbreak of the Franco-German war, in which he distinguished himself by inaugurating in the French army the American ambulance service as it had been developed during our Civil War. Ardent in his southern temperament, he determined that he would not live under the flag of our union. On this account he voluntarily expatriated himself and when abroad wrote his little volume on gynecology which almost at once gave him fame through Europe. Although not the first to operate for biliary obstruction, he was the first American to do the operation which was performed abroad, and, although he

never repeated it, he elaborated and published the details of the technic much as used to-day.

In London I was the student of Paget, Ericson and Sir Spencer Wells with much profit. Mr. Paget asked me one day if I was familiar with the administration of ether, saying that he had heard much of its use in Boston, and, if so, he would like to have me etherize a patient for him. He stated that there had recently been six deaths from chloroform in the public service of London, and that he sought a safer anesthetic. I was introduced by him to the several hundred students occupying the amphitheater, while a small, nervous woman was brought in for operation. By good fortune the patient was soon asleep without a struggle, and Mr. Paget stated that, in so far as he knew, it was the first time that ether had been used as an anesthetic in London.

Only a very little later Sir James Simpson, who first used chloroform in surgery and stoutly declared that the only danger from its administration lay in the incompetency of the anesthetizer, had a patient die on the table before the operation was begun. Although a man of enormous physical vigor, he had greatly overtaxed himself and in his weakened condition the shock resulting from this death caused him to take to his bed and four days later he died from angina pectoris. The surgical profession of all Europe mourned his loss as that of a brother, and when, soon after, I visited his grave, the worn turf for a considerable space about his burial-place gave evidence of the crowds of both rich and poor who had thus sought to honor his memory.

Through the kindness of Dr. Storer it had been arranged that I should spend the summer under this great man. In the fulfilment of my plan I determined to remain in Edinburgh and thought to profit under another of Scotland's great teachers, Professor Syme. Sadly a few days later I attended his funeral. Chief among the mourners a medium-sized man, accompanied

by a tall lady, was pointed out to me. It was Mr. Joseph Lister, who had married Professor Syme's daughter and through his influence had come to Edinburgh to be his successor in practice. My informant, a young local physician, said he was full of strange notions and that nobody in Edinburgh wanted him.

A few days later I presented my card and was received most cordially. I shall never forget the morning. His beds were on the first floor of the old infirmary, which was none too clean or attractive. He showed me a number of his patients; among others two or three with resections of the elbow-joint. The little patients were almost without pain or suffering, with only a moderate amount of serous discharge. Convinced by what I saw before the morning ended, I asked to be his special student for the summer; and day by day I learned more and more to admire and wonder at the miracles of modern surgery that I saw. I had heard much of Scotch character and had witnessed what I had deemed the extreme of ill temper exhibited by members of the profession in Boston, but that to which Lister was subjected exceeded all. Men well known in the world of science passed and repassed Mr. Lister in their rounds of daily duty without a nod of recognition, and this was by no means the limit of disapproval shown.

As Virchow in the former year had supervised the selection of my pathologic equipment, so Mr. Lister kindly aided me in obtaining a generous supply of his surgical material. The large rolls of his carbolic-lac-plaster puzzled our revenue officers in determining under what schedule they should be rated for duty. I was the first American pupil of the then almost unknown Mr. Lister, but in the enthusiasm of youth I thought it an easy matter to convert my brethren, forgetting for the moment that the master himself was the target of the most bitter criticism and that his methods were decried as unscientific and absurd. When I sought to make a

practical demonstration in the hospitals of Boston I was frigidly told that when my services were desired I should be notified. Stung to the quick by the cool, bitter criticisms of many whom I had considered friends in the profession, refused a hearing on the subject before the medical societies, I, unwisely, as I now think, refused a professorship in Chicago and determined that Boston should yet recognize the value of the teachings of my master and honor me as his pupil. I opened a private hospital and, regardless of fee, welcomed whoever would come to me. Of course, little by little the results of my operative procedures became known. In a complacent way it was stated that I was lucky and later that I picked my cases. In 1876 I received a royal welcome in the American Medical Association when my beloved Dr. Sims was president..

I established a laboratory for bacteriologic and pathologic research, having the good fortune to secure the able assistance of the late Dr. A. P. Holt and Dr. Samuel Nelson of Cambridge, Mass. This work was continued fifteen years, the chief problem under consideration being the rôle of bacteria in their relation to surgery, then called surgical pathology. The tender sensibilities of women of doubtful age caused complaint of our work and the society of the long name became actively interested in our little colonies of rabbits and guinea-pigs kept in my large garden for experimental research. Thus from year to year, besides communications to many of the journals, I brought the fruitage of our work to the American Medical Association, until now each year since 1876 I have been in unbroken attendance and yearly have contributed the results of my studies. I am sorry to confess that the new teaching made slow progress in its acceptance, and not until after it had met German approval did the leading surgeons of Boston consider favorably its adoption.

I offer this brief chapter of personal history, since, in a way said to be peculiar to Boston, it is now claimed

for one of its leading hospitals that antiseptic surgery was there first practiced and its methods introduced by its surgeons into America. Although such experiences are intensely bitter, they may be welcomed, since the better qualities and the higher attainment are the fruitage. At about this period Dr. Sternberg began his bacteriologic research work, and for years we were the pioneers in this field of knowledge so revolutionary in its practical teaching. We first knew each other through our publications. His wise superiors at Washington thought that this young medical officer was wasting his time in such foolish study and he was ordered to service upon an island in the Pacific. Replying to a letter of indignation on my part advising his resignation, he wrote, "Such experiences make the discipline of life. It is a long road that has no turn." The bestowal of the first honors that the government can confer on a medical officer shows that he was far wiser than I, although in a measure I tried to profit by his philosophic advice.

Little by little the unknown factors of the problem of infection and how to avoid it were slowly mastered, until now we look in wonderment on the revolutionary results of its teaching. Although general surgery has profited as never before, the battle royal of aseptic surgery was fought and won within the realm of the abdominal cavity. It would be almost invidious to single out from the considerable army of modern contributors the names of men still living and comparatively young to whom our great profession owe a debt of gratitude. A coming generation will do them ample honor. As the fruitage of my own work in research, there came almost by inference certain practical deductions.

Although in other publications I have shown that the buried animal suture is justly accredited to an early generation of American surgeons, its modern use and the reasons of its safe application are the triumph of Lister's genius, who knew nothing of this work so well

done by Dr. Jamieson, whose experimental demonstrations were published in 1827. In the days of my pupilage with Mr. Lister, although he ligated arteries with seeming impunity, cutting short the catgut ligature and closing the wound aseptically, it had never occurred to him to bury sutures. He often called our attention to the interrupted stitch taken through and through, showing that active proliferation under aseptic conditions was not provocative of pus, but that the most active cell change took place in the deeper layer of the skin, where, if permitted to remain sufficiently long, the suture material separated, leaving the deeper portion to be absorbed. To me it seemed a simple corollary that the entire stitch could be buried and that like parts in well-vitalized tissues could be rejoined.

The first practical outcome of this reasoning was in 1870 in the cure of hernia, the cases being published in 1871. The keynote of the reasoning, the reconstruction of the parts to their normal anatomic condition, simple as it seemed, has proved the solution of the "thousand-year-old problem of surgery" and is in daily practice in all parts of the civilized world. It followed that every variety of hernia could be easily and simply cured. The causes of ventral hernia after operative interference were easily shown to be a maladjustment of the like structures of the abdominal wall, necessarily incident to the joining of the parts by the through-and-through interrupted stitch. This was easily obviated by the careful reunion of like structures by layers of continuous absorbable sutures. Such was the outcome that in the last 2,000 cases of laparotomy with primary union, in which the sundered structures were rejoined in layers with buried kangaroo tendon continuous sutures, I am not aware of a single case of hernia following operation.

The greater victories, however, have been won within the abdominal cavity. Very naturally the largest factor of success in the treatment of pathologic conditions

here found result in an earlier recognition and surgical intervention. Ovarian and uterine tumors are rarely permitted to develop into the conditions in which they were commonly found by the earlier operators: a most important factor when comparing the statistical tables that is often overlooked. Tumors without adhesions leave the peritoneum as a rule uninjured. The intestines are disturbed only by displacement. Modern technic permits an easy inspection of the pelvic cavity and bleeding vessels are readily secured. The vexed question of the pedicle, so long a stumbling-block to our fathers, is easily solved. It early appeared to me to be very important to cover, in so far as possible, all excised and denuded surfaces with healthy peritoneum, first the pedicle of the ovarian growth; and in 1880 I first put in practice the infraperitoneal treatment of the cervical pedicle in the removal of myomatous growths.

"In 1880, assisted by my distinguished teacher, Dr. Gilman Kimball, of Lowell, I removed the uterus for the first time, for a large multiple myoma, where I adopted a modification of Schroeder's method, embodying all that is at present considered essential. Commencing on one side, I sutured the broad ligament with a double continuous tendon suture, extended so as to include the cervix. The broad ligaments were divided, the peritoneum reflected from either side, the stump cut down conically and covered over by an intrafolding of the peritoneum with a continuous sero-serous animal suture. The suture thus taken intrafolded the peritoneum evenly, while it was itself buried beneath it, leaving no line of infraction of the pelvic peritoneum. Thus the stump, while dropped within the abdomen, was itself extraperitoneal. This method seemed to me so important an improvement on that of Schroeder that I reported it in a paper read at the International Medical Congress¹ held in London in 1881. I incorporated it

1. Marcy, Henry O.: *The Surgical Treatment of Uterine Myomata*. Trans. Internat. Med. Cong., 1881, II. 233.

in further detail in my address on "Fibroid Tumors of the Uterus" as president of the Section on Obstetrics and Diseases of Women of the American Medical Association in 1882. In 1887 I reported still further my experiences with this method and emphasized its value. I also pointed out the importance of dealing with the larger number of uterine myoma which developed in such a way as to have really no pedicle. My last special contribution upon this subject was a paper entitled "The Surgical Treatment of Non-Pedunculated Tumors," read at the American Medical Association in May, 1890. Up to that period, in common with nearly every other abdominal surgeon, I had considered hemorrhage the greatest of all dangers; and in order to lessen this, I advocated and used the so-called rubber-dam, a thin sheet of rubber with a central reinforced opening which was stretched over the tumor and crowded down as far as possible to the base, around which was placed a constricting rubber ligature. The suggestion of its use occurred to me from noting the admirable service rendered the dentist by the constricting rubber placed around the root of a carious tooth. It served the double purpose of controlling hemorrhage and keeping the abdominal cavity entirely free from surgical contact. This was applicable, however, only to moveable tumors with a more or less distinct pedicle.

An aseptic operation thus carefully performed leaves a comparatively uninjured peritoneal cavity without points for subsequent adhesion, and convalescence speedily follows on the restoration of intestinal function.

The removal of the appendix, now a daily operation, is practically without danger when the operation is performed before the appendix ruptures and peritonitis sets in. In my entire series of several hundred cases I have not seen a patient seemingly approach the danger-line. It happens that I was the first operator in the world to remove the appendix in the so-called periods between the attacks. The credit of this interference was

due to the insistence of the patient, a wise physician, who had concluded that this was the period of special safety. So important was the operation considered then that a number of leading surgeons came over from New York to witness it. This was in November, 1886.

The surgery of the biliary tract is so recent that it requires only reference. In 1880 Lawson Tait enthusiastically told me of his long series of operations, then numbering nearly forty. I have already referred to the case of Dr. Sims, and most know that Dr. Dobs of Indiana was the first surgeon in the world to operate successfully on the gall bladder. This was due, however, to accident rather than design, since the gall bladder was so distended with fluid that it was believed to be an ovarian cyst. I happen to be the first surgeon in America to operate successfully for biliary obstruction, the patient being a physician, aged about 70. This was in July, 1887. In October, 1889, I removed a gallstone from the common bile duct (the patient visited me only recently), and this proved to be the first patient operated on in the world for the removal of a stone lodged in the common duct. Now these operations, only so little ago declared by the leading authorities beyond the realm of surgery, are of such frequent occurrence that they cause little comment. Operation on the intestinal tract, on the bladder within the abdominal cavity, and even on the spleen and liver are by no means of rare occurrence.

The drainage of wounds, so long considered absolutely necessary, is the decided exception and should be almost never resorted to in aseptic conditions.

Thus closes a brief summary of the most brilliant achievements of modern surgery; and the contribution of the most important factors has been the work of American surgeons. There is good reason for believing that this is due in large degree to the openmindedness of her students. In the early part of this generation Germany claimed the rôle of honor in her teaching and

would learn little from Great Britain and less from France. Great Britain, smarting under the loss of her recent prestige, refused to accept the teaching of either Germany or France; and France, in turn, which had claimed the banner for a century, would profit nothing from Germany or England. The American student without prejudice sought profit from all and earned the award so generously given by Virchow in his introductory address as President of the International Medical Congress in Berlin in 1890 when he said "America leads the world in surgery."

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