

Gross (Sam^l W.)

THE
IMPRESS OF AMERICAN SURGERY
UPON SURGICAL PRACTICE.

AN ADDRESS INTRODUCTORY TO THE SIXTIETH COURSE OF LECTURES IN
THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA,
DELIVERED SEPTEMBER 30TH, 1884.

BY SAMUEL W. GROSS, A.M., M.D.,
Professor of the Principles of Surgery and Clinical Surgery.

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An Address Introductory to the Sixtieth Course of Lectures in the Jefferson
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BY SAMUEL W. GROSS, A.M., M.D.,

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In the introductory address of my colleague, Professor Brinton, delivered at the opening of the fifty-eighth course of lectures in this school, attention was drawn to the illustrious men who had been mainly instrumental in advancing the "March of Surgery" from the age of Homer to the close of the eighteenth century. Not a single American found a place in the list, since, as we shall soon see, it was not until a few years after the commencement of the present century that we made any original contributions to the art of surgery, our forefathers having previously blindly obeyed the precepts and followed the practice of their predecessors and contemporaries of the Old World. A knowledge of the deeds of our own surgeons should not only not fail to interest the student, but should also exert a happy influence in stimulating him, if not to rival their achievements, at least to sustain the dignity and honor of his profession, and to give his best efforts to the service of his fellow men. It is for these reasons, as well as for the purpose of placing on record, for easy reference, the original operations and

suggestions which have marked our progress during the past eighty years, that I have chosen as the subject of my discourse, "The Impress of American Surgery upon Surgical Practice."

In the autumn of 1809, a messenger rapped this knocker, which was attached to the door of a modest house in Danville, a small village in the interior of Kentucky. The summons was answered by a handsome man, with a frank countenance, florid complexion, brilliant black eyes, muscular frame, nearly six feet in height, and thirty-eight years of age, who was informed that his services were needed by a lady living in Green county, nearly sixty miles distant, whose professional attendant supposed her to be in the last stage of a difficult pregnancy. Obeying the call, he found that the patient was suffering from an excessively painful abdominal tumor, for the relief of which, after having fully explained the dangers of an hitherto unperformed operation, he suggested removal of the mass, if the lady would place herself under his charge at his own home. This she gladly did; and in December of the year just mentioned, with the assistance of his nephew and a private pupil, the surgeon, who had been a member of the medical profession only twelve years, having pursued his studies at the University of Edinburgh, removed the tumor through an incision, nine inches in length, carried through the walls of the abdomen to the outer side of the left rectus muscle. At the expiration of twenty-five days the lady returned to her home, and enjoyed good health until her last illness, in 1841, her life having been prolonged for thirty-two years. The bold and original surgeon, who assumed a responsibility

which the surgeons of the Old World shrank from, was Ephraim McDowell ; the heroic woman who submitted to the experiment was Mrs. Crawford ; the operation was ovariectomy, or the extirpation of an ovarian cyst, the first of its kind ever practiced, and that, too, successfully, before anæsthesia, the employment of antiseptic agents, and the toilet of the peritoneum were even dreamed of.

And so this modest knocker, which was presented to Professor S. D. Gross by the Kentucky State Medical Society on the occasion of the dedication of the monument erected to the memory of McDowell by that body, in 1879, summoned one whose courage, knowledge and skill enabled him not only to relieve a suffering woman of a disease previously deemed incurable, but at the same time to usher into existence the young infant, American Surgery ; for, prior to this achievement our own operators had done nothing original, if we except the use of the seton in ununited fracture, introduced by Physick, in 1802.

The crude operation was practiced by its deviser thirteen times, with a result of eight cures, one failure from adhesions, and four deaths. For many years it had few imitators ; and when attempts were made, nearly forty years ago, to place it upon a firm and systematic basis, mainly through the agency of Clay, of Manchester ; John Atlee, of Lancaster, and Washington L. Atlee, of Philadelphia, the departure from the tradition of the dangers of opening the peritoneal cavity was bitterly opposed, and its adherents were so derided and denounced, that not a few operators were afraid to append their names to their recorded cases. At the

present day, from having been one of the most fatal, it has, under improved methods, become the most successful of all capital operations, and it is gratifying to know that the means of reducing the mortality, namely, the intraperitoneal method of dealing with the pedicle, originated with Dr. Nathan Smith, of Baltimore, in 1821.

Could America boast of no other achievement, she would have every reason to be proud of her contribution to the Art of Surgery, since, apart from the influence which it has undoubtedly exerted upon modern abdominal and pelvic surgery, it has already added over forty thousand years to the sum of female life. If one name is entitled to be kept fresh in the memory of women of all parts of the civilized world, surely it is that of McDowell, and with it should be associated that of Mrs. Crawford, the first of her sex to submit to ovariectomy.

It is scarcely possible, in the time that is allotted to me, to do more than give a hurried sketch of the original contributions to American Surgery since its comparatively recent birth. They are not, as might naturally be expected, very numerous, nor are they equally important; but such as they are, they will, if I mistake not, compare favorably with those accredited to other countries.

Beside McDowell's great contribution to abdominal surgery, America lays claim to four other important additions to the practical surgery of the abdominal organs, namely, nephrectomy, enterectomy and enterorrhaphy for artificial anus or fecal fistula, oöphorectomy and cholecystotomy.

Extirpation of the kidney, or nephrectomy, was originally performed by Dr. E. B. Wolcott, of Milwaukee, in

1860, on account of a medullary carcinoma weighing two pounds and a half. The patient, a man fifty-eight years of age, died, on the fifteenth day, of exhaustion due to profuse suppuration. Up to the present date the operation has been practiced for malignant tumors at least 30 times, with 11 recoveries, and 19 deaths. Although the mortality—63.33 per cent.—is so great, I am of the opinion that, in view of the invariably fatal termination of the disease if left to pursue a natural course, the patient should be given the chance if he desires it; and this opinion is strengthened by the belief that the future will show better results if nephrectomy be resorted to in the early stage of the affection, or before the surrounding tissues and distant organs are invaded by it.

For the relief of that most disgusting lesion, artificial anus, Dr. Physick, in January, 1809, reëstablished the natural route of the feces, by destroying the éperon or spur-like process between the two intestinal cylinders with the seton. The operation, however, soon fell into desuetude, the seton having been replaced by the enterotome of Dupuytren. As Dupuytren's operation was very uncertain in its results, Dr. S. D. Gross, in 1847, urged excision of a portion of the bowel, with suturing of the divided ends, but the patient would not submit to the procedure; and it remained for Dr. R. A. Kinloch, of Charleston, S. C., in 1863, to carry the suggestion into effect, the subject recovering with a small fistule, which discharged a little serous fluid. Up to the present time enterectomy and enterorrhaphy have been practiced at least 54 times, with 35 recoveries and 17 deaths, or a mortality of 35 per cent. Hence

it - will be seen that the procedure is a serious one, and that it should only be resorted to in simple cases when other measures have failed, and in complicated cases not amenable to ordinary methods of treatment.

In 1872, Dr. Robert Battey, of Rome, Georgia, successfully removed the ovaries for inveterate neuralgia of those organs. The object of oöphorectomy, or Battey's operation, is to permanently establish the menopause for grave diseases which are incurable without it, and has found its chief application in cases of amenorrhœa, dysmenorrhœa, menorrhagia, uterine myomata, neuralgia, and certain nervous affections, as epilepsy, insanity, and suicidal tendencies due to disease of the ovaries. Like all new operations, it encountered much adverse criticism, but its safety and the propriety of its performance are now firmly established. From a table of 218 cases collated from all sources by Battey, in 1881, I find that 40, or 18 per cent., died, but the mortality, under improved methods, has so rapidly decreased, that the procedure may be said to be attended with very little risk. Indeed, in the hands of such skilled surgeons as Lawson Tait, Savage, and Knowsley Thornton, two or three deaths in the hundred should be the greatest limit.

On June 15, 1867, Dr. J. S. Bobbs, of Indianapolis, successfully opened the abdomen and removed from the distended gall bladder fifty small stones. The operation was repeated by Dr. J. Marion Sims, of New York, ten months subsequently, but the woman perished on the ninth day. Up to the present date, cholecystotomy has been practiced 31 times, with 26 recoveries and 5

deaths, results which entitle it to be regarded as an accepted surgical procedure.

Four months before John Hunter demonstrated the cure of aneurism upon scientific principles, or in August, 1785, there was born at Glen Cove, Long Island, one who was destined to shed imperishable lustre on the surgery of this country, and who seemed to have been created especially to confirm the truth of the practice of the illustrious Englishman. Valentine Mott not only deligated more important vessels, and with a greater degree of success, than any surgeon who has ever lived, but, in 1818, in the thirteenth year of his professional life, when he was thirty-three years of age, he was the first to execute the bold, brilliant, and difficult feat of taking up the innominate artery for an aneurism of the subclavian, through which he established the fact that the circulation in the parts supplied by that trunk could be maintained after a ligature had been cast around it. Although the patient perished from hemorrhage on the twenty-sixth day, the operation made the name of Mott famous throughout the civilized world, and his reputation is not marred by the untoward issue, since the procedure, with two exceptions, has proved fatal in the twenty cases in which it has been resorted to. In 1864, Dr. A. W. Smyth, of New Orleans, tied simultaneously the innominate and common carotid arteries for subclavian aneurism, and succeeded in averting death from secondary hemorrhage by ligating the vertebral artery on the fifty-fourth day. This entirely original operation marked an era in surgery, as it demonstrated that the secondary bleeding, which, with one exception, has

always followed ligation of the innominate, if the subject survives long enough, may be stopped by securing the vertebral, which carries blood into the subclavian on the distal side of the thread.

In 1820, Mott took the initiative in tying the common carotid artery for innominal aneurism, the patient dying from hemorrhage on the twentieth day. In a second case, which occurred nine years later, the man recovered from the operation, and life was prolonged seven months. The practice thus instituted has been resorted to in 20 instances, of which 5 recovered, only one, however, being a permanent cure, the man being alive at the expiration of thirty-four years. Despite these unfavorable results, the measure has been the means of lengthening life when threatened by pressure on the trachea or rupture of the sac, and for this reason deserves to be retained as a recognized surgical recourse.

Continuing with the surgery of the vessels of the neck, it will be found that Mott was really the first, in 1833, to tie both carotids simultaneously, the interval between the application of the threads having been only fifteen minutes. The operation was performed for malignant disease of the parotid gland, and death ensued, in twenty-four hours, from coma, cerebral disturbance being one of the dangers of the operation, even when a few weeks intervene between the ligation of these trunks. Dr. McGill, of Maryland, ten years previously, had successfully secured both carotids, after an interval of one month, on account of fungous tumors of both orbits; but the time which had elapsed between the two operations was sufficient for the establishment

of the collateral circulation, so that the operation was essentially that of ligating a single artery, through which the procedure differs most materially from that of Mott, to whom the credit is justly due. In connection with these cases it is interesting to note that Dr. J. M. Carnochan, of New York, in 1867, tied both carotids, after an interval of six months, on account of elephantiasis of the neck, ear and face, with the effect of reducing the size of the growth and improving the appearance of the patient. To this surgeon is due the merit of having founded a new principle of treatment in this hideous and intractable affection, his first attempt in this direction having been made in 1851, when he successfully secured the femoral artery for elephantiasis of the lower extremity. Up to the present date, both primitive carotids have been ligated, either simultaneously or after a longer or shorter interval, at least 37 times, with 27 recoveries and 10 deaths.

Ligation of the left subclavian artery in the first portion of its course, an operation deemed impracticable by Colles, Harrison, Flood, Guthrie, Quain and Mott, on account of the anatomical dangers with which it is attended and the fear that a coagulum of sufficient size to occlude the vessel would not form, was first practiced by Dr. J. Kearney Rodgers, of New York, in 1845, for aneurism. The man died, on the fifteenth day, of hemorrhage from the vertebral, which was given off at the site of the ligature; but the operation, which in point of brilliancy difficulty, and seriousness, must rank with deligation of the innominate, demonstrated its possibility, and the vessel was occupied by a firm, adherent clot, three-quarters of an inch long. In his

comments upon this case, Dr. Rodgers suggested that the fatal bleeding might have been prevented by ligating, simultaneously, the principal branches given off by the subclavian on the distal side of the thread; a suggestion that was acted upon by Dr. Willard Parker, of New York, in 1863, who tied the right subclavian on the tracheal side of the scalene muscles, together with the common carotid and vertebral arteries, for subclavian aneurism. Death occurred, on the fifty-second day, from hemorrhage of the distal side of the subclavian, and surgeons are almost unanimous in the opinion that the operation should not be repeated.

In 1874, Dr. Warren Stone, of New Orleans, recorded a unique case of cure of traumatic aneurism of the second portion of the subclavian by digital compression of the third division as it passes over the first rib. In thirty-nine hours the tumor was harder, reduced one-half in size, and pulsated more feebly, and the symptoms gradually diminished, until they finally disappeared at the expiration of nine months.

The common iliac artery was first tied by Dr. William Gibson, then of Baltimore, in 1812, for hemorrhage on account of a gunshot wound of that vessel, but death ensued, on the thirteenth day, from peritonitis and secondary bleeding. In 1827 Dr. Mott was the first to tie it for aneurism of the external iliac. The operation was successful, the man being entirely well in about eight weeks, and alive eighteen years subsequently. Statistics show that the primitive iliac has been ligated in at least 79 cases, of which 74.68 per cent. perished, a most gloomy record, and one that warns us to avoid

the operation when the causes which appear to demand it can be remedied by other measures.

Dr. Joseph Pancoast, of Philadelphia, in 1844, described a method of exposing the axillary artery in the first portion of its course, or between the clavicle and the pectoralis minor muscle, which is less difficult and less dangerous than the ordinary process. In 1880, Dr. H. B. Sands, of New York, throwing aside ancient traditions, successfully secured, under antiseptic precautions, the left common iliac artery, for an aneurism of the external iliac, by an incision through the peritoneal cavity. These are, so far as I am aware, the only original American contributions to the manual procedure of ligating arteries.

With a view of arresting the progress of inflammation in serious injuries of the lower extremity, and avoiding the necessity of amputation, Dr. H. M. Onderdonk, of New York, in 1813, ligated the femoral artery, thereby saving a life imperiled by a wound of the knee-joint; and Dr. D. L. Rogers, of the same city, was equally successful in a similar operation, in 1824. Without any knowledge of what had previously been done in this direction, Dr. H. F. Campbell, of Augusta, Georgia, in 1866, called the attention of the profession to the remedy, and alleged "that no hand, wrist, forearm, or elbow, no foot, ankle, leg, or knee, should ever be amputated for excessive or destructive inflammation, especially those cases resulting from traumatic causes, without resorting, whenever the state of the patient will admit of it, to a previous experimental ligation of the artery supplying the affected region." The value of the practice was attested by the experience of Dr.

D. F. Wright, during the War of the Rebellion, and by a recovery after violent inflammation of the limb, in a case of gunshot wound of the knee-joint, in the hands of Mr. Maunder, of London.

The prevention of hemorrhage during operations upon the extremities, by rendering them bloodless, is really an American procedure, for long before Esmarch published his method, I had repeatedly seen the elder Pancoast and elder Gross empty the limb of its blood with an ordinary roller before applying the tourniquet, and I have no hesitation in declaring that they are as efficient as the elastic bandage and band or tubing, while they do not subject the divided parts to the dangers and inconveniences of superficial gangrene. This practice was noticed on more than one occasion in the published clinics of the Jefferson Medical College; but it was not insisted upon; and Esmarch is entitled to the credit of having pushed it into general adoption. In June, 1860, Dr. Joseph Pancoast cut off the circulation in the lower extremity by means of a large Skey's tourniquet applied to the aorta, and successfully amputated at the hip-joint for sarcoma of the femur, thereby robbing the operation of one of its previously greatest dangers, namely, primary hemorrhage. When the patient is so much exhausted that he can ill afford to part with the blood contained in the limb about to be sacrificed, Dr. Erskine Mason, of New York, advised that the extremity be first rendered bloodless by Esmarch's apparatus, the tube being wound around the limb as near to the trunk as is consistent with the formation of the flaps, before the aortic compressor is applied. In this way the entire quantity of

blood lost to the general circulation will be confined to the small amount contained in the vessels between the two compressing agents. Another valuable and original suggestion in this direction, in view of the occasional inconveniences attending the employment of the abdominal tourniquet, is direct digital compression of the common iliac artery on the brim of the pelvis, with the hand inserted into the rectum. This measure, recommended by Dr. Frank Woodbury, of Philadelphia, in 1874, was modified, in 1877, by Mr. Davy, of London, by substituting a wooden rod for the fingers, which, however, cannot be applied with safety to the right primitive iliac.

The employment of animal ligatures that would be absorbed after they had fulfilled their purpose, without giving rise to suppuration or interfering with the healing of wounds, elements which constitute so important a part of the present system of antiseptic surgery, is also of American origin. In 1814, at the suggestion of Dr. Physick, Dr. John Syng Dorsey successfully ligated a large artery in a horse with a buckskin ligature, and Dr. Joseph Hartshorne, soon afterward, in amputating the thigh, at the Pennsylvania Hospital, secured the vessels with strips of parchment. Dr. Dorsey, after numerous experiments, preferred ligatures made of French kid, and used them with so much success in amputations and other capital operations that he expressed the belief that they would supplant all others, although he confessed that they occasionally gave rise to suppuration and abscess. In 1827, Dr. H. G. Jameson, of Baltimore, published the results of his experience with the buckskin ligature, which he employed for many

years in all his operations without an accident. At the request of Dr. Physick, who seemed to be determined to find a safe substitute for the ordinary thread, Dr. H. S. Levert, of Mobile, in 1828, conducted a series of experiments with various wires, the outcome of which was the adoption of the silver ligature, which was first employed, in 1858, by Sir James Y. Simpson, of Edinburgh, in a case of extirpation of the female breast. One year later, Dr. Warren Stone, of New Orleans, cast a silver wire around the common iliac, for aneurism of the external iliac artery, cutting the ends short, and leaving it in the wound, a practice which has been successfully adopted by S. D. Gross, C. H. Mastin, Agnew, and others, through which the safety of the procedure is firmly established.

In concluding the additions to the surgery of the vascular system, I may be permitted to state that, in two papers contributed to the *American Journal of the Medical Sciences*, for 1867, I conclusively proved, from an examination of wounds of the internal jugular vein, the largest venous trunk to which a ligature is applicable, that deligation of the veins is a perfectly safe procedure, and thereby set at rest the conflicting views which eminent surgeons had held upon this subject previous to my investigations.

Passing now to the affections of the bones and joints, we shall meet with fresh proof of American skill, daring and ingenuity. Dr. W. H. Deadrick, of Rogersville, Tennessee, in 1810, was the first to excise a portion of the lower jaw, the case being one of chondroma of that bone, in a lad fourteen years of age, and the portion removed extending from just in front of the ramus

to the symphysis. The boy was alive thirteen years subsequently. Valentine Mott, in 1821, resected one-half of the bone; and Dr. J. M. Carnochan, in 1851, led the way in removing the entire bone at one sitting. With the view of obviating deformity of the face, Dr. John Rhea Barton, of Philadelphia, in 1831, in a case of benign tumor, excised a longitudinal piece of the jaw without interfering with its base. In 1820, Dr. H. G. Jameson, extirpated the entire upper jaw, with the exception of its orbital surface, which was not invaded by the tumor; and the honor of resecting both maxillæ is due to Dr. D. L. Rogers, of New York, who performed the operation successfully in 1824. Dr. A. H. Stevens, of New York, in 1823, removed a considerable portion of the upper jaw without any external incision, thereby avoiding a scar upon the face.

The entire clavicle was first excised by Dr. Charles McCreary, of Kentucky, in 1813, on account of caries occurring in a scrofulous lad fourteen years of age. The patient survived thirty-five years, with good use of the corresponding limb. It is not probable that the operation required any very great amount of skill in its execution, or that it was attended with any particular risk from wounding the subjacent structures; so that it pales into insignificance when compared with that of Valentine Mott, who, in 1828, removed nearly the entire bone on account of a morbid growth. The operation, which Dr. Mott considered the most delicate, difficult, and dangerous which he had ever performed, involved the exposure of the subclavian vein, thoracic duct, and phrenic nerve, demanded forty ligatures to arrest the hemorrhage, and occupied nearly four hours

in its execution. The patient had complete use of the arm until his death, in 1882, fifty-four years subsequently. Dr. F. Peyre Porcher, of Charleston, published an account of a post-mortem dissection of the parts in the *American Journal of the Medical Sciences*, for January, 1883, from which it appears that the acromial end of the clavicle, measuring one inch and three-quarters in length, had not been removed, and that nature had provided for the loss of the remainder by the formation of a ligamentous band, two inches long and half an inch wide.

Dr. R. D. Mussey, then of Dartmouth, New Hampshire, in 1837, removed the scapula and the entire clavicle of a man forty years of age, six years after amputation at the shoulder, and nineteen years after amputation at the metacarpus, on account of osteoid sarcoma, the patient being alive and sound thirty years after the last operation. This remarkable case is the more interesting, as it is an example of recovery after that dangerous accident, the introduction of air into the veins, and as it illustrates the importance of removing recurrent malignant growths as fast as they reappear. In 1836, Dr. Dixie Crosby, also of New Hampshire, removed the scapula, arm, and three-fourths of the clavicle of a man thirty-six years of age, on account of sarcoma, who died of return of the disease in twenty-eight months. A similar operation was performed by Dr. Amos Twitchell, of Keene, New Hampshire, in 1838.

Dr. R. B. Butt, of Virginia, excised the inferior two-thirds of the ulna in 1825; the olecranon process was removed by Dr. Gurdon Buck, of New York, in 1842, on account of hyperostosis interfering with the move-

ments of the elbow-joint; and the entire bone was excised by Dr. J. M. Carnochan, in 1853. The entire radius was also extirpated by Carnochan, in 1854; and both bones of the forearm, with the exception of the lower end of the radius, were excised by Dr. Compton, of New Orleans, in 1853. The lad had a very good use of the hand, although the limb was three inches shorter than its fellow.

Coccygectomy, or excision of the coccyx, for intractable neuralgia of that bone, was first performed by Dr. J. C. Nott, of Mobile, in 1832, with the effect of affording permanent relief. Dr. W. A. McDowell, of Fincastle, Virginia, in 1827, successfully removed about seven inches of the sixth and seventh ribs of a scrofulous female, detaching them at their articulation with the spine. The operation, which was a subperiosteal one, is the only one of its kind, so far as I know, on record.

With a view of permitting free drainage for the pus in empyema and favoring the obliteration of the sac by permanent contraction of the walls of the chest, Dr. Warren Stone, of New Orleans, in 1862, trephined the rib over the most dependent portion of the cavity, an operation which he subsequently repeated in several instances, with the most gratifying results. The credit of excising a portion of one or more ribs to accomplish the same objects, a practice recently advocated by Estlander, of Helsingfors, must be awarded to Dr. A. G. Walter, of Pittsburgh, who, in 1857, removed two inches of the eighth and ninth ribs, followed by a cure in eleven months. In 1798, Dr. Nathan Smith, of New Haven, was the first to trephine for suppurative

osteomyelitis, through which he gave vent to the imprisoned matter, and saved the limb. The operation of Petit, practiced half a century earlier, was for a circumscribed abscess, and not for diffused medullary inflammation threatening necrosis of the bone.

I believe that I will not be considered extravagant when I state that in the treatment of simple fractures of the long bones our surgeons are distinguished above those of other countries. Of the many original and valuable contrivances which they have devised for this purpose it is, of course, impossible to speak in a discourse like this ; but I cannot refrain from calling your attention to a form of dressing employed in fracture of the shaft of the femur, which combines several distinct American improvements over older plans, and constitutes the simplest, safest, most efficient and most comfortable mode of managing these injuries of which I have any knowledge. A firm bed having been provided, and the limb divested of hair, a strip of adhesive plaster, two and a half to three inches in width, is applied to the one side of the limb, commencing just below the seat of fracture, and carried several inches below the sole of the foot to a corresponding point on the opposite side. Previous to the application a perforated block of wood, about three inches and a half long, is fastened to the middle of the strip, its object being to prevent pressure on the malleoli and serve as a point of attachment for the extending cord. The plaster is confined in position by several circular strips, and by a bandage carried from the toes to the groin. The fracture having been reduced by the usual means, and retained in position by short splints, the foot of the bed

is elevated several inches, through which the weight of the patient's body is made the counter-extending force, and a weight of from five to twelve pounds is attached to the cord, which plays over a pulley at the foot of the bed. The dressing is completed by applying bags of sand on each side of the limb, to keep the latter steady and prevent its eversion. This is the plan of dressing almost universally employed throughout the United States, and is known abroad as the "American method."

The first improvement, first in importance as well as in the order of discovery, in the dressing which I have briefly outlined, was the use of adhesive plaster for making extension, for which we are indebted to Dr. J. K. Swift, of Easton, Pennsylvania, his claims of priority having been established by his pupil, Dr. S. D. Gross, in his translation of Tavernier's *Operative Surgery*, published in 1829, and who subsequently took the initiative in employing adhesive strips in the management of fractures of the clavicle, ribs, and scapula. The second valuable modification of the old plan of treatment was the substitution of a weight playing over a pulley for the gaiter and other uncomfortable appliances, which originated with Dr. W. C. Daniell, of Savannah, Georgia, in 1819. The third improvement was the elevation of the foot of the bed to replace the perineal band as a means of counter-extension, which was introduced into practice by Dr. J. L. Van Ingen, of Schenectady, New York, in 1857. Short coaptation splints were recommended by Dr. Gurdon Buck, of New York, in 1861; and bags of sand were suggested by Dr. William Hunt, of Philadelphia, in 1862.

In connection with fractures of the femur, the shortening which almost invariably attends any plan of treatment, even in the hands of the most skillful practitioners, is a question of grave importance, not only to the patient, but to the surgeon as well, who is not infrequently called upon to defend himself in a suit for alleged malpractice. That the accident cannot be avoided is attested by the experience of centuries; and it can scarcely be a source of wonder, in view of the recent startling discovery of the inequality or asymmetry in the length of the lower extremities of the majority of uninjured persons, made by Dr. W. C. Cox, at the Pennsylvania Hospital, in 1875, and subsequently confirmed by Dr. T. G. Morton, Dr. W. Hunt, and Dr. J. B. Roberts, of Philadelphia, Dr. J. S. Wight, of Brooklyn, and Callender and Garson, of London. This fact demonstrates the slight value of measurements, as the limb may have been shorter or longer than its fellow before the bone was broken.

The treatment of fracture of the patella by uniting the fragments with silver wire originated with Dr. John Rhea Barton, of Philadelphia, upwards of half a century ago, the result being fatal. The operation was lost sight of until 1861, when Dr. E. S. Cooper, of San Francisco, had a successful case, and it was repeated, in 1864, by Dr. Logan, of Sacramento, with an equally gratifying issue. It appears to have been again lost sight of until 1877, when it was revived by Dr. Cameron, of Glasgow, and prominent attention was called to it, in 1883, by Sir Joseph Lister. Of 97 cases which I have collated, 93 recovered, and 4, or rather more than 4 per cent., died. In 20 per cent. of the cases the joint sup-

purated, and in 3.6 per cent., the thigh had to be amputated. Hence, I am of the opinion that the procedure should be restricted to cases in which the ordinary treatment has failed to secure union, and that it should only be done, under these circumstances, by those who have had a large experience with aseptic surgery.

Dr. O. H. Allis, of Philadelphia, in 1876, pointed out a valuable sign in the diagnosis of fracture of the neck of the femur, namely, more or less relaxation of the fascia lata between the crest of the ilium and the great trochanter.

America has made several valuable contributions to the surgery of ununited fracture. In 1802, Dr. Physick, effected a cure, in less than five months, of an ununited fracture of the humerus, of twenty-two months' duration, by passing a skein of silk, by means of a long seton needle, between the fragments. Perforation of the ends of the bones, usually ascribed to Dr. D. Brainard, of Chicago, was first employed by Dr. William Detmold, of New York, in 1850, the fracture being one of the tibia. Dr. Joseph Pancoast, of Philadelphia, in 1857, secured the fragments by pinning them together with an iron screw, an operation which, when applied to the femur and humerus, is far more efficient than mere perforation, and safer than the seton.

The honor of having taken the initiative in the cure of bony angular ankylosis belongs to American surgeons. On the 22d of November, 1826, Dr. John Rhea Barton, in a case of synostosis of the hip-joint, made a crucial incision over the most prominent point of the great trochanter, and divided that process transversely,

along with a part of its neck, with a strong and narrow saw. The limb was placed in Desault's apparatus; passive motion was made in three weeks, and on the 1st of the following March, the record states that "he can advance the foot twenty-four inches; by stepping backward, twenty-six inches; in abduction, twenty inches; rotation inward, six inches; outward, six inches." Although the angular deformity was relieved, the attempt to establish a false joint was a failure, as the movements just alluded to were gradually lost.

In 1830, Dr. J. Kearney Rodgers, in a similar case, excised a disk of bone from between the trochanters, and the motions of the artificial joint continued for two years and a half. Dr. L. A. Sayre, also of New York, in 1862, still further modified the operation, by removing a plano-convex piece of bone from between the trochanters, and rounding off the upper end of the lower fragment, in order that it might play in the concavity of the upper fragment. At the expiration of six years the patient had a good use of the limb; and in a second case, on death six months after the operation, a false joint was found to have been established.

The three operations have been performed in at least 17 instances, with 7 deaths, or a mortality of 41 per cent.

For the relief of bony ankylosis of the knee, at a faulty angle, our own surgeons have devised certain ingenious and notable operations, the earliest of which, practiced by Dr. John Rhea Barton, in 1835, consists in the excision of a cuneiform piece of the shaft of the femur above the condyles, not including its entire diameter, and fracturing the undivided portion, after

which the limb is fixed in an almost straight position until union is effected. In 1844, Dr. Gurdon Buck, in a case of complete synostosis with the leg flexed at a right angle, cut out the condyles of the femur, the head of the tibia, and the patella, in a wedge-shaped piece, and adjusted the limb, as in the former case, but the result was not so gratifying, on account of the greater amount of shortening. Barton's procedure has yielded 2 deaths in 16 cases, or a mortality of 12.5 per cent., while of 53 cases of Buck's operation, only 5, or 9.4 per cent. died.

To replace this risky procedure, Dr. Brainard, of Chicago, in 1854, suggested subcutaneous perforation and fracture of the femur above the joint, and bringing the limb at a proper angle for future usefulness; and the suggestion was successfully carried into effect, in 1859, by Dr. Joseph Pancoast. One year later, however, Dr. Brainard drilled the condyles, and the patient recovered with a good limb. In 1859, the Chicago surgeon perforated the joint itself, on account of false ankylosis, combined with partial osseous union of the patella with the external condyle, and, luckily for the patient, the measure was a success. In 1861, Dr. S. D. Gross introduced subcutaneous drilling and disruption of the osseous bands, with forcible manual extension for complete osseous ankylosis of the knee, or a condition which rendered the joint perfectly tolerant of rough interference. Although this was the first operation of the kind ever practiced, it is proper to add that it was, unknown to Professor Gross, suggested in 1842, by Malgaigne, as a substitute for Barton's operation, but he distinctly states that he should not like to resort to

it unless in a very urgent case. All of the 7 patients subjected to the operation recovered with useful limbs.

In 1840, Dr. J. M. Carnochan, for the relief of ankylosis of the lower jaw, divided the masseter muscle subcutaneously, and in endeavoring to pry open the mouth, fractured the base in front of the contraction, whereby the patient was enabled to open the mouth an inch and a half. Despite his best directed efforts, however, the fracture united; but the case suggested to Dr. Carnochan the idea of establishing an artificial joint, by simply dividing or removing a wedge-shaped piece of the bone, which he did not, however, attempt, on account of the bad condition of the patient.

Eight years after the appearance of the account of this case in Mott's edition of *Velpeau*, or in 1855, Esmarch suggested the excision of a cuneiform section of the jaw, and Wilms, of Berlin, actually practiced it in 1858. Rizzoli, of Bologna, in 1857, merely cut through the jaw; so that the operations known in Europe as those of Esmarch and Rizzoli, are really those of Carnochan, who was, moreover, the first to divide the masseter muscle for the cure of the affection. In a case of synostosis of the left side of the lower jaw, in a girl seven years of age, Dr. S. D. Gross, in 1873, succeeded in establishing excellent motion by excising the condyle, along with a portion of the neck of the bone, the operation being entirely original in conception and in practice. Two years later, Dr. J. Ewing Mears, of Philadelphia, effected the same object, by excising the coronoid and condyloid processes, along with the upper half of the ramus.

For many advances and improvements in the treat-

ment of affections of the joints, the world is indebted to the wisdom, skill, and ingenuity of American surgeons. Early in the present century, Physick insisted upon absolute immobility in the management of inflammation of the joints. In coxalgia he not only confined the patient to his bed, but applied a curved splint, extending from the middle of the side of the thorax nearly as far down as the ankle, to the limb in its faulty position, until the inflammation had so far subsided that the extremity could be brought straight, in which position he maintained it until all signs of disease had disappeared. In 1835, Dr. W. Harris, of Philadelphia, was the first to direct attention to extension along with fixation of the joint in coxalgia. He employed Hagedorn's splint to fulfill these indications, and expressed himself as being fully satisfied that the new treatment, if "timely applied, and continued a sufficiently long time, will prevent any shortening of the limb or deformity." In 1860, Dr. H. G. Davis, of New York, published an account of his plan of keeping up extension in all stages of the disease, at the same time that he permitted the sufferer to exercise in the open air. The splint, with which the principle of relieving intra-articular pressure was effected, was afterwards greatly improved by Dr. L. A. Sayre, of New York, and is now in daily use. In this connection, I may state that the first intimation of the employment of adhesive strips and a weight for making extension in coxalgia was made in the paper of Dr. Davis, who employed these measures to overcome muscular contraction before applying his walking splint.

Dr. Joseph Randolph, of Philadelphia, in 1830,

suggested, in addition to enforced rest in the horizontal posture, which up to that date was the only local measure advocated in the treatment of caries, or Pott's disease, of the spine, the application of a "splint, carved of light wood, and made to fit the back, so as to afford firm support to the spine and prevent the least possible motion of the vertebræ." At the present day the management of this grave affection is of the most simple nature, consisting, as it does, merely of affording proper support, and removing the weight of the head, while the patient exercises in the open air. For these purposes, the plaster jacket of Dr. L. A. Sayre, which he first employed in 1874, has almost certainly superseded all other devices, the majority of which are expensive, heavy, irksome, cumbersome, and useless. If the distinguished orthopædic surgeon had done nothing more than popularize this outcome of his plastic genius, he would be justly regarded as one of the greatest medical benefactors of this or any other era. In connection with his invention, I am happy to state that he has done me the honor to adopt and recommend my suggestion of using the support for the head when the disease is seated in the middle dorsal region, or even below that point.

For the use of elastic compression, by means of a rubber bandage applied from the toes upward, in synovitis of the knee, we are indebted to Dr. H. A. Martin, of Boston, who employed it for the first time in 1853. Applied as tightly as it can be borne within the bounds of comfort, it affords an immediate sense of comfort and support, the fluid is soon absorbed, and the functions of the joint are speedily restored. In obstinate

cases, when the amount of fluid is large, the application of the bandage is preceded by aspiration of the joint. In upward of one hundred cases managed in this way, all recovered without an accident. Dr. Sayre, for many years, and certainly as early as 1853, has effected elastic compression with a sponge saturated with water and confined with the ordinary roller. To the latter surgeon is also due the merit of having introduced the principle of free drainage in carious joints, the material used being oakum. In this way he has succeeded in saving many limbs, which, in former times, would have been condemned to amputation.

Although manipulation in the reduction of dislocations dates back to remote antiquity, the credit of having erected it into a system and urged its general adoption, belongs to Dr. W. W. Reid, of Rochester, who published the results of his observations in 1851. Dr. Dixie Crosby, of New Hampshire, in 1826, devised a means of reducing backward dislocation of the thumb and fingers, which frequently succeeds when other plans fail. The severe suffering induced by the pressure of the luxated head of the humerus upon the brachial plexus of nerves was first relieved, in 1869, by Dr. Edward Warren, then of Baltimore, by excising the head of the offending bone; and Dr. J. Ewing Mears, of Philadelphia, in a similar case, in 1876, cured his patient by resorting to the less grave operation of dividing the humerus subcutaneously through its surgical neck, and establishing a false joint. By destroying the continuity of the bone in this way its head was kept quiet and the constant tension of the muscles was done away with. In a case of like nature, de-

pendent, however, upon enlargement of the bone, Dr. G. C. Blackman, of Cincinnati, in 1870, afforded permanent relief by excision. Dr. L. A. Dugas, of Augusta, Georgia, in 1856, pointed out a pathognomonic sign of dislocations of the shoulder, namely, the inability of the patient to place the hand of the injured limb upon the opposite shoulder while the elbow is placed in contact with the front of the thorax. In 1874, Dr. O. H. Allis, of Philadelphia, called attention to the fact that, in dislocation of the head of the femur into the sciatic notch, when the two limbs are placed at right angles with the recumbent body, the displaced one will appear one or two inches shorter than its fellow, instead of a few lines, as when the limbs are extended. When there is any difficulty in detecting the head of the bone in its new situation, it may be felt, as was first suggested by Dr. Squire, of Elmira, New York, in 1860, by passing the finger into the rectum or vagina.

In view of the difficulty of keeping the parts in apposition, Dr. S. D. Gross, in 1859, suggested the propriety of connecting, with silver wire, the articular extremities in dislocations of the sterno-clavicular or acromio-clavicular joints, and successful cases of the operation were subsequently recorded by Dr. J. T. Hodgen, of St. Louis, and Dr. E. S. Cooper, of San Francisco.

A number of bold, severe and complicated operations upon the nerves for the relief of neuralgia and other affections have been devised by American surgeons. In 1856, Dr. J. M. Carnochan performed the first excision of the second branch of the fifth pair of nerves

beyond the ganglion of Meckel; in 1858, if I mistake not, Dr. Joseph Pancoast removed a portion of the same trunk in the pterygo-maxillary fissure; and Dr. S. D. Gross, in 1863, excised, for the first time, the entire inferior maxillary nerve, from its entrance into the inferior dental canal to its exit at the chin. Dr. H. B. Sands, of New York, in 1871, cut out a portion of the brachial plexus near the points of exit of the nerves from the spinal canal, for traumatic neuralgia; and Dr. F. F. Maury, of Philadelphia, two years later, repeated the operation, on account of multiple neuromata of the shoulder and arm. In 1873, Dr. T. G. Morton, of Philadelphia, excised the enlarged perineal nerve for vaginal neuralgia. Dr. S. D. Gross, in 1870, described a form of neuralgia of the jaw bones, in which he afforded relief by cutting away the alveolar border; and Dr. T. G. Morton, in 1873, performed his first excision of the fourth metatarso-phalangeal articulation on account of a peculiar form of neuralgia to which he was the first to direct attention. The same surgeon, in 1878, excised one inch and a quarter of the sciatic nerve for elephantiasis of the leg, after previous ligation of the femoral artery, with the effect of reducing the size of the limb.

In 1881, at the request of Dr. S. D. Gross and Dr. S. Wier Mitchell, I removed an inch and a half of the external branch of the spinal accessory nerve and completely divided the sterno-mastoid muscle two inches below the mastoid process, for the relief of that distressing and intractable affection known as spasmodic wry-neck or clonic spasm of the cervical muscles. This double operation is the only one of its kind on record.

In concluding the surgery of the nervous system, I may add that suturing divided nerves was first advised by Dr. S. D. Gross, in 1859, since which date it has been resorted to in upwards of seventy instances, with, as a rule, the most gratifying results.

The contributions of American surgeons to the affections of the urinary and reproductive organs are most important. In 1861, Dr. F. N. Otis, of New York, discovered the remarkable distensibility of the male urethra, the influence of which upon the management of stricture by larger instruments than had previously been used, and upon the modern operation of lithotrity, has been invaluable. The same surgeon, in 1870, demonstrated the existence of strictures of large calibre, and the relation which they bore to what had hitherto been regarded as obscure and intractable disorders.

• The year 1878 was rendered memorable in the annals of surgery by a great advance in the treatment of vesical calculus, which has already proved to be a priceless boon to mankind, and for which we are indebted to Dr. H. J. Bigelow, of Boston. Litholapaxy, or rapid lithotrity, owes its successful and brilliant career to the facts that the urethra admits instruments of sufficiently large dimensions to crush a bulky stone, and that the bladder is tolerant of such prolonged manipulation that the fragments can be washed out at a single sitting. This operation has extended the field of crushing, enabling us not only to deal with larger concretions than we formerly dared to attack, but also to relieve cases previously relegated to lithotomy.

That lithotrity at one sitting is destined to supersede

the old operation of crushing as well as lithotomy in adult calculous patients is shown by the experience of a single surgeon. Sir Henry Thompson, up to June, 1884, had operated upon not less than 782 adult males. Of 110 lithotomies 39, or one in every 3 perished; of 478 lithotrities 33, or one in every 14.5 died, while of 194 litholapaxies, 10, or one in every 19.4, proved fatal. More than this, by employing instruments of small size, Dr. Keegan, of Indore, has shown that the procedure is as well adapted to male children as it is to persons of more mature years. Thus, of sixteen operations in that class of subjects all recovered.

Although it was originally suggested by Mr. Guthrie, of London, cystotomy for obstinate and intractable inflammation of the male bladder was first carried into effect by Dr. Willard Parker, of New York, in 1850, and the practice was extended to the female bladder, in 1861, by Dr. Nathan Bozeman, of New York. In 1851 Dr. S. D. Gross suggested the propriety of opening the abdominal cavity, and sponging out the extravasated urine in rupture of the bladder, a procedure which was successfully resorted to, in 1862, by Dr. Walter, of Pittsburg. Ingenious operations for the relief of exstrophy of the bladder were devised, in 1858, by Dr. Joseph Pancoast, in 1871, by Dr. F. F. Maury, in 1876, by Dr. R. J. Levis, all of Philadelphia, and, in 1876, by Dr. H. J. Bigelow, of Boston; the credit of having obtained the first successful result being due to Dr. Pancoast.

An ingenious operation for incurvation of the penis, consisting in the excision of a wedge of the cavernous bodies, was devised by Dr. Physick. I am unable to

give its date, as the only mention of the procedure that I have been able to discover, is to be found in Dr. Pancoast's work on Operative Surgery, published in 1844, in which due credit is awarded to Physick. In 1870, Dr. L. A. Sayre pointed out the connection between adherent and contracted prepuce and partial paralysis of the lower extremities, through which the causation and cure of one form of this obstinate affection were cleared up. Dr. S. D. Gross, in 1860, was the first to describe the disease, to which he gave the name *prostatorrhœa*.

Although Dr. W. E. Horner, of Philadelphia, in 1837, dragged down the uterus to utilize it in the closure of a vesico-utero-vaginal fistule, and Dr. Washington L. Atlee, in 1853, led the way in the removal of uterine fibroids, gynecological surgery on this side of the Atlantic, which now commands the admiration of the entire world, scarcely had an existence until 1852, when Dr. J. Marion Sims, then of Montgomery, Alabama, first established upon a firm basis the operation for vesico-vaginal fistule, by combining into one harmonious whole the use of the speculum, the silver suture and the retaining catheter. The invention of the peculiar speculum which he employed was, of itself, a great achievement, since it opened up new fields of examination and treatment.

In the short time that remains, I cannot do more than enumerate what I conceive to be the most important and useful of the original American additions to this department of my branch. The operations of Sims for prolapse of the uterus, in 1856, for vaginismus, in 1857, and for amputation of the cervix, in 1859; those

of Dr. Thomas Addis Emmett, of New York, for lacerated cervix in 1862, for prolapse of the uterus in 1869, and for flexions of the uterus in 1874; the reduction of an inverted uterus by digital compression of both horns, by Dr. E. Næggeroth, of New York, in 1862; the cure of a utero-vaginal fistule, by Dr. T. Parvin, then of Indianapolis, in 1867; vaginal ovariectomy, in 1870, by Dr. T. Gaillard Thomas, of New York; the extirpation of the ovaries, for the relief of "imperfect ovulation awakened by excessive menstrual molimen," by Dr. Robert Battey of Rome, Georgia, in 1872; and the pneumatic reduction of dislocated uterus, in 1875, by Dr. H. F. Campbell, of Augusta Georgia. Of these surgeons, the Jefferson Medical College is proud to claim Sims, Emmet and Battey.

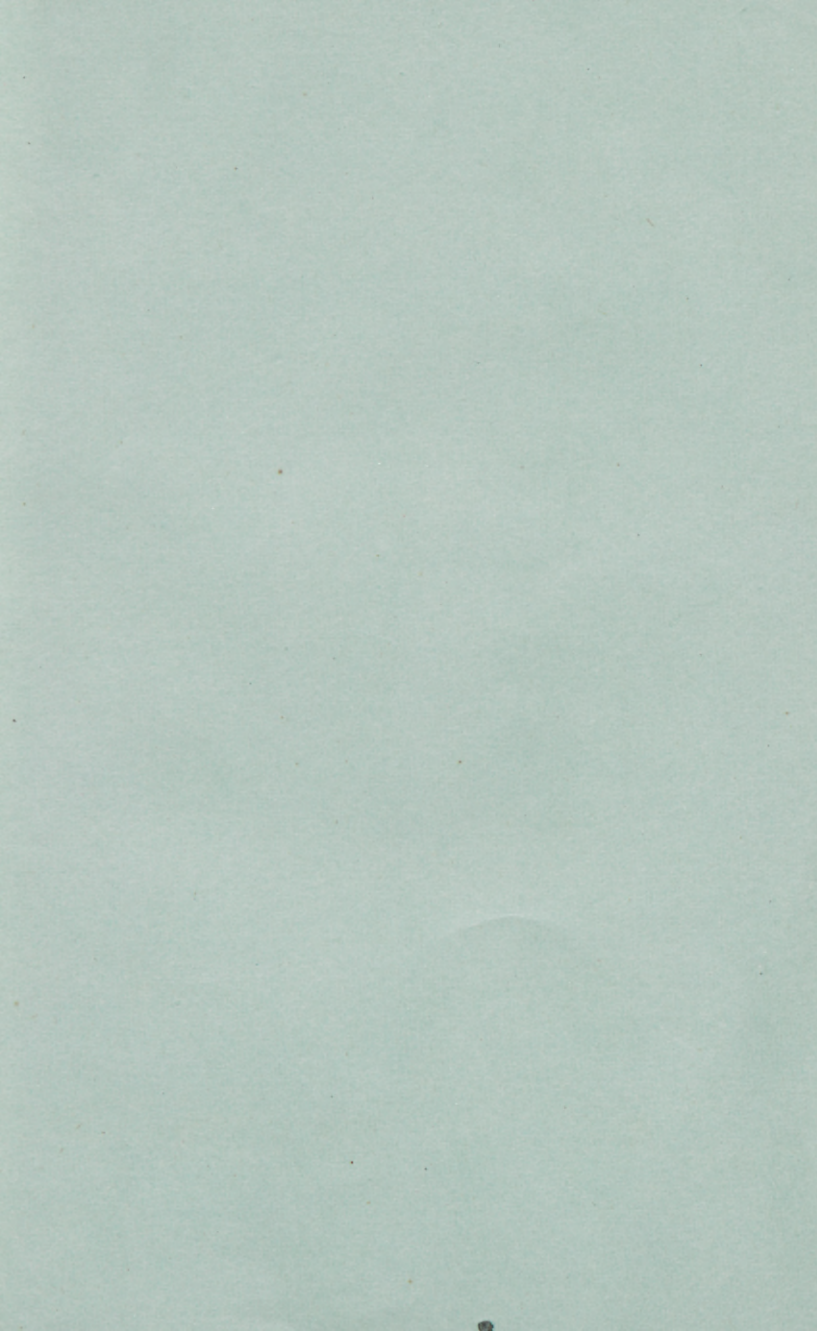
Among the remaining American contributions to general surgery, may be mentioned, the first operation for the cure of artificial or abnormal anus, by ligating the spur-like process, by Dr. Physick, in 1809; the description of, and operation for, preternatural pouches of the anus, by the same surgeon, in 1792; the intra-peritoneal method of dealing with the pedicle in ovariectomy, by Dr. Nathan Smith, of Baltimore, in 1821; the first account of cystic tumor of the lower lip, in 1839, and of congenital hypertrophy of the gums, in 1855, by Dr. S. D. Gross; the first removal of a carcinomatous tonsil through the neck, in 1866, by Dr. D. W. Cheever, of Boston; the injection of iodine in spina bifida, by Dr. D. Brainard, of Chicago, in 1848; the opening of perityphlitic abscess, by Dr. Willard Parker, in 1843; skin-grafting in old ulcers, in 1854,

by Dr. Frank H. Hamilton, then of Buffalo; the treatment of chronic ulcers by the elastic bandage, by Dr. H. A. Martin, of Boston, in 1877; the suturing of tendons, in 1862, by Dr. S. D. Gross; the description of a painful affection of the foot, which he termed pododynia, by the same surgeon, in 1864; an amputation of the foot, by Dr. S. F. Forbes, of Toledo, Ohio, in 1874; a modification of Pirogoff's amputation, suggested in 1859, by Dr. S. D. Gross, and subsequently performed, with excellent results, by Quimby, Turnipseed, and Post; an operation for salivary fistule, by Dr. W. E. Horner, about 1850; and, finally, the cure of fissures of the hard palate by uranoplasty, in 1843, by Dr. J. Mason Warren, of Boston. The operations for the radical cure of hernia, suggested by Pancoast, Gross, Agnew, Dowell, Jameson, Heaton, and J. H. Warren, need only be referred to, since, like all similar procedures, they rarely afford any permanent benefit.

The discovery of anæsthesia, through which many of the operations to which I have alluded were rendered painless, is the greatest of our contributions to the art of surgery, the credit of its application being due to Dr. W. T. G. Morton, of Boston, who, after having successfully employed ether in the extraction of teeth, administered that agent, in October, 1846, at the Massachusetts General Hospital, in a case of removal of a tumor of the neck, by Dr. John C. Warren. For his discovery of the protection afforded by vaccination against smallpox, England awarded Jenner thirty thousand pounds; while the discoverer of anæsthesia illustrated the ingratitude of a republic in dying poor

and unrequited for the inestimable good he had conferred upon his fellow-men.

Having now opened the sixtieth course of lectures in the Jefferson Medical College, I have to bid you a most hearty welcome to the halls of my alma mater, and express the deep interest felt by the Faculty in your success in life, which, you need scarcely be told, will depend, in great measure, upon the progress you may make in the prosecution of your studies, and upon the habits you may form during your novitiate. With the view of giving you better facilities in the former direction, the course was two years ago lengthened to six months, and practical work in the laboratories was added, thereby affording you advantages which were not even dreamed of twenty-seven years ago, when, like you, I was a student on these benches. My own branch is not more important than the others taught in this institution. Hence I do not attach undue prominence to it. All the branches are equally essential to a thorough medical education, because they are interdependent. Let it, therefore, be your aim to cultivate all with equal assiduity, and wait until you have earned your degree, before you pay special attention to the one by which you are most attracted.



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