Infantile paralysis in 17th century Lancashire / by A. Fessler.

INFANTILE PARALYSIS IN 17th CENTURY LANCASHIRE

by

A. FESSLER, M.D. (Vienna), M.R.C.S., L.R.C.P.

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MALONEY[1] (1949), by analysing the following case history and post mortem report, has been the first to establish the fact that infantile paralysis occurred towards the end of the 17th century on the continent of Europe. In 1699, a boy of six years, living in Alsace, developed suddenly a paralysis of both his legs after he had had a ride on the shoulders of his brother. His right leg remained permanently paralysed, but his left leg recovered after a considerable time so that he was able to walk short distances with the help of a stick. He became a printer by trade and died of a fever at the age of forty in 1733 in Strassbourg. J. G. Salzman, who had performed the necropsy, published his findings in 1735. He found that the right leg was shorter than the left one and that nearly all its muscles were considerably wasted. Salzman expressed the opinion that the paralysis was caused by a strain of the muscles of the legs which strain took place when the boy was riding on the shoulders of his brother; the left leg recovered because less strain had been exerted on this side than on the other side. There can be hardly any doubt that Maloney is right in assuming that the history of the paralysis, its sudden onset, and the partial recovery from it, as well as the pathological changes of the muscles of the leg which remained paralysed, are typical of polyomyelitis. Concluding, Maloney suggested that further research should be done "to uncover earlier cases".

English Local History Documents which deal with the administration of the poor-relief constitute a source of information which can be used for this type of research. Whilst I was carrying out an investigation of the Lancashire records with regard to the conditions of the sick poor during the 17th century (Fessler)[2], I came across a few documents concerning lame children or persons who had become lame in their youth, which seem to suggest that infantile paralysis has been the cause of the lameness.

A large number of the poor who presented a petition to the Quarter Sessions, asking for relief, described themselves as being "lame". This term appears also frequently in the orders concerning the payments of allowances, which orders the Justices of the Peace issued to the churchwardens and the overseers of the poor who were responsible for the administration of the Poor Law Statute in the parishes. The term "lame" acquired some form of legal significance after it was laid down in the Elizabethan Poor Law Statute (43. Eliz. c. 2) that the parishes had to "raise competent sumes of Money for and towardes the necessarie Reliefe of the lame impotente olde blinde and such others amonge them beinge poore and unable to worke"[3]. The further details, however, which most of the lame petitioners gave of their distressed condition, allow one, in quite a number of cases, to diagnose with a varying degree of certainty the cause of the lameness. The two principal causes were a paralysis after an apoplexy, and a crippling form of arthritis. Phrases like "the use of the limbs hath been suddenly taken away" indicate the first of these two causes, especially if the person who presented the petition (or for whom it was presented) belonged to the higher age groups. References to a lameness combined with severe pains in the back, in the hips or in other joints, point to the second cause.

Among the petitions which concern lame children, lame adolescents or lame persons who had become lame in their youth, are, as has been stated above, a few, altogether ten, which suggest that their lameness might have been caused by an attack of infantile paralysis. In contrast to children who "had been borne lame" or who "had been lame since infant" (congenital malformation, e.g. dislocated hip, etc.), these children or adolescents had been healthy until they were suddenly "struck lame". The lameness usually affected the lower extremities; some of the children recovered partially, like the case analysed by Maloney, sometimes it was stated that the distemper proved to be incurable. All the illnesses which are suggestive of infantile paralysis occurred at two different periods of the century. The first period lasted from about 1630 to 1640, the second period corresponding to the outbreak on the continent, described by Maloney, started towards the end of the century.

The lameness of Edward Williamson, a husbandman living in Tarbock, near Liverpool, who in 1700 applied to the Justices for a weekly allowance to be paid by his parish, can be dated back to the late twenties of the 17th century. Williamson, who described himself as being about 75 years old, informed the Justices in his petition that when he was "about two years ould or under (he) was as it pleased God strucke lame from the right hip downwards soe that after a great sickness was verie like not to goe at all but in process of time it pleased God to give such strength that I could goe more and more soe when I came to ensuing the Tenement my father left

7 Clothorn Rd.
Manchester 20.

25. 1. 1958

Dear Dr Keevil,

I enclose herewith a reprint of a paper in which I have tried to use the conjectural evidence given by your relics records for the study of the history of a diocese.

Yours sincerely

A. Fessler

me I could have gone a mile or two without the need of a stick—but it hath pleased God soe that within the foure or five years last past soe to debilitate and weaken my bodie that I cannot goe up and down the house without the helpe of two sticks to support me beside I cannot endure the wind wett or could on my bodie any of which torment me and are much aggravated by a rupture I gott two or three twentie years ago". (Q.S.P. 844/16).

Another example of a petition which suggests that there might have been an outbreak of infantile paralysis in Mid-Lancashire in the 1630s, is the petition of Jean Rigby, a poore widdow in Ormskirk who in 1634 applied for relief because she "hadd 3 children of which it pleased Almightie to stricke lame one of them insomuch it is in no wayes able to helpe itselfe as all the towne knoweth". (Q.S.P. 5/150).

In the same year the Justices granted "6sh a month" to John Holland of Wigan, who had stated in his petition that "Ellen Holland his daughter is fallen lame and God hath taken her Lymes from her who in her health gott sufficiently to mayntayne herselfe and now shee beinge fallen Lame your petitioner hath spend all his moneis in getting her helpe for the recovery of her lymes and they cannot be recovered". (Q.S.P. 1/142).

Infantile paralysis might have been the cause of the lameness which affected a young girl, living in the 1690s in Bedford, near Leigh. Her mother, Katharine Howard, a widow, presented in 1694 two petitions to the Quarter Sessions, asking for help for herself and her two daughters "All miserable Objects of Christian Compassion and charity". The mother was probably suffering from a severe form of arthritis because she stated that "for many and severall yeares she hath been sadly afflicted with long and lingering sickness, lameness and other still continuing distempers of body insomuch that for a long time she hath not beene able to goe out of doores nor sometimes to walke in the house without the help of some good neighbours". In her second petition she even stated that "shee is not able to go up and down her little cottage but upon her hands and knees". She stated further that "shee hath liveing with her—two young daughters the one about seaven yeares old and the other about eleaven. And both of them are miserably afflicted as it pleased Almighty God thus to deale with them all, for the Elder which might have beene something helpfull in this case is struck lame in both her feet as not being able to go out of doore or begg abroad for releefe, the Younger girl by what distempers it pleased God to fall into her head is blind of both her Eyes". (Q.S.P. 758/9 and Q.S.P. 762/14).

Young Peter Hope of Salford who in 1699 gave an account of his plight in his petition was perhaps also a victim of infantile paralysis. He has "been Lame Ever since he was two years of Age, so that he was never able to work for a Livelyhood; but had been maintained by his father, Except something that your petitioner Endeavoured to gett By playing of the viall amongst his neighbours. And your petitioners father wanting work he went into the County a quarter of a yeare ago which time your petitioner hath never heard of him and the Landlord wanting Rent for the house hath taken from your petitioner his viall which was all he had for mentainance". (Q.S.P. 833/20).

The lameness of Edward Cayton of Brockholes, near Preston, can also be dated back to the probable outbreak of infantile paralysis towards the end of the 17th century. In 1720, when he was thirty years old, he applied for relief. He stated that he "has been lame and infirme ever since hee was two years old, cannot help or remove himselfe without assistance". (Q.S.P. 1166/17).

I have not been able to find in any of the 17th century English writings a description of any illness which could be interpreted as infantile paralysis, although occasionally one can find references to lame children. Willis[4] reports for example the case of a three years old child which had a "palsy on the right side" the findings of the post mortem however seem to indicate that the child had been suffering from a form of meningitis. Wiseman[5] included the following observation in his treatise on the King's Evil. "A Child of about 3 years old, healthfull from its Cradle, was on a sudden taken lame in its right Hip. I compared the Hips, and found that swelled, and the Leg beginning to emaciate". With the help of purging, embrocations, etc., Wiseman was able to cure the child and he added that he had "others of this kind" under his care but "partly by reason of the progress the Disease had made before and partly through the Impatience of the Patents, the Cure hath failed". Wiseman was fully aware of the great confusion which existed in the second half of the 17th century in regard to the diagnosis and differential diagnosis of the King's Evil. Therefore it does not seem

likely that he would have diagnosed as the King's Evil a lameness in a child which was not accompanied by any pathological changes in a joint; he warned for instance that a child might become lame "after luxation of the os femoris".

It is often difficult, sometimes even impossible, to substitute the modern appropriate diagnosis for a diagnosis which was in use in former times because not only the names of the diseases have changed in the course of time, but occasionally the diseases themselves have changed. One has to be even more careful and cautious in interpreting the illnesses mentioned in the petitions of the sick poor, as they are described, and often even diagnosed, by lay people. In spite of these reservations it might be possible to state that the Lancashire Poor Relief Records indicate the occurrence of infantile paralysis in England during the 17th century. It is likely that the examination of similar records of other counties will provide further information.

My thanks are due to Mr. R. Sharpe France, Archivist of the Lancashire County Council, who has given me access to the records, and to Mr. G. Wilson, Librarian of the Manchester Medical Library, for his support.

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AMERICAN PIONEERS IN ABDOMINAL SURGERY

BERNARD J. FICARRA, M.D.

Resident Surgeon, Kings County Hospital

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AMERICAN PIONEERS IN ABDOMINAL SURGERY

BERNARD J. FICARRA, M.D.
Resident Surgeon, Kings County Hospital
BROOKLYN, NEW YORK

THE rise of specialism and its rapid advancement is the most startling single feature of modern medicine. Surgery as a distinct specialty is representative of the various specialties. The changes wrought in abdominal surgery during the past fifty years are so amazing that to recount a surgeon's experience of that period would simulate an apocryphal tale.

Less than a century ago the most serious operations were performed without the aid of anesthesia and without the benefit of the most rudimentary aseptic precautions. Even in 1890 abdominal operations were infrequently performed. An appendectomy was a rare procedure and the surgical technic of the period was gruesome.

It is related how Dr. Alexander Mott, dressed in a Prince Albert coat, with white shirt cuffs showing, operated at Bellevue. He would put the scalpel in his mouth with several strands of waxed silk. The sponges used were ordinary reef sponges kept in the usual type wash basin. The water was changed only when it became too bloody. Instruments were kept in a mahogany box carrying case. When the operation was completed, the instruments were dried and replaced in the velvet-lined box for the next patient.[25]

From this primordial beginning has been formulated a highly technical and scientific specialty. Early American surgeons were concerned in applying the surgical knowledge in America which they had gained from Europe. Our surgeons of this century have advanced beyond their preceptors and now enjoy the leading world position in surgical progress and practice. With the acquisition of this leadership, the debt of gratitude which the world owes to American surgery has increased beyond all estimation. Although many nations, older than America, have contributed many notable accomplishments, pioneers in American surgery evolved the basis for the modern advancement of this specialty. This advancement is displayed not only in regard to original research but in the introduction of newer methods of treatment, in the perfection of older operative procedures, and in tangible results. These achievements of American surgery cannot help but elicit universal admiration from the surgeons of the world. What our country has contributed to the creation of modern abdominal surgery is the worthy subject of this essay.

COLONIAL SURGERY

When the colonies were about to be molded into a nation, the name of no American appeared upon the honor scroll of brilliant men who had made the surgery of the world famous. Occasionally, an outstanding surgeon is noted, but his fame is purely local. Others, such as Dr. Warren and Dr. Prescott, were imbued with the patriotic spirit, thereby forsaking their profession for the cause of liberty. It was through their efforts that the movements of the British troops were reported to the colonial army. In the colonial army itself Dr. Jones was the best known surgeon (from 1775 to 1781). Among the great things which medical officers of the American army have contributed to medicine,

attention is drawn to the first American book on surgery. This was written by Surgeon John Jones, U.S.A. (1729–1791) which was published in 1775. This book contains many pages on the treatment of war injuries and detailed descriptions of amputations. Jones was appointed the first occupant of the chair of surgery at Columbia University.[15] The first professor of surgery in colonial America was William Shippen (1736–1808). At one time he was Director General of the Continental Army. He was appointed professor of surgery at the University of Pennsylvania in 1766.[15]

The turbulent days of the period permitted no chronology of medical history. For this reason scattered individual surgical contributions are recorded as indicative of the progress in colonial America. The honor of leading the procession belongs to John Bard (1716–1799) of New York. In 1759, Bard performed what is called a "gastrotomy" for extra-uterine pregnancy. This procedure was subsequently repeated in 1791, and again in 1799, by William Baynham (1749–1814). Samuel (1742–1821), the son of John Bard, organized Columbia Medical School becoming its first dean. He was physician to George Washington when the seat of government was in New York. A name worthy of mention is Thomas Bond (1712–1784). He was apparently the first in the United States to perform a lithotomy. Bond and his son, Phineas Bond, rendered a distinguished service in 1776 by actively organizing the medical department of the colonial army. As an interesting notation it is recorded that Benjamin Franklin invented the flexible catheter.[8]

These patriotic men of medicine were our first practicing surgeons. Courageous in war and science, it was they and their successors who founded our schools of medicine and brought into being American surgery.

FOUNDERS OF AMERICAN SURGERY

The history of great deeds is basically the story of the men who have perfected them. In the history of surgery two men stand forth as the fathers of American surgery: Philip Syng Physick and Ephraim McDowell.

Philip Syng Physick (1766–1837) studied at the University of Pennsylvania under Adam Kuhn and then went abroad to study under John Hunter. In 1792, he received his degree from Edinburgh. In 1794, he was elected surgeon to the Pennsylvania Hospital. Later he was made professor of surgery at the University of Pennsylvania. As a teacher he acquired the title, "Father of American Surgery." One of his most publicized operations was the lithotomy performed on Chief Justice Marshall, in 1831, when the judge was in his seventy-fifth year. Physick was one of the first surgeons to employ gastric lavage. He perfected an operation for the cure of "artificial pouches" (diverticuli) in the alimentary canal (1809). He devised a procedure of ligating artificial openings (fistulas) which had been made in the intestine due to pathological changes. Among his other achievements may be mentioned his description of rectal diverticuli and his operation for artificial anus (1826). As an innovation he introduced the use of kid and buckskin ligatures (1816) and invented the tonsillotome.[22]

The dawn of abdominal surgery starts with the historical scene in Danville, Kentucky, 1809. Dr. Ephraim McDowell (1771–1830), an unknown pioneer surgeon, trained in Edinburgh, was called to see Mrs. Jane Todd Crawford, sixty-five miles away in Greenville. The story of how she consented to submit to ovariotomy is too well known to recount. In the subsequent years, McDowell performed the operation twelve times, seven of which were successful. His valiant initiative was a great stimulus toward the development of American surgery. As the originator of this operation he made possible the development of the present field of abdominal surgery. McDowell's pioneer surgery will live in the memory of science as long as time endures.

Encouraged by the splendid results of McDowell, other American surgeons began to report their successes. Four years later a complete hysterectomy was performed by Joseph Glover of South Carolina (1813). Two surgeons, brothers, John Light Atlee (1799–1885) and Washington Lemuel Atlee (1808–1878) assisted in establishing ovariotomy after McDowell. They elaborated a procedure which enabled them to perform 465 operations in 1842 and 1843.[11] Other names prominently associated with ovariotomy are Nathan Smith, Dunlap, Peaslee, Kimball, Sims and Thomas. Against all these men the most caustic invectives were hurled. Yet their fearless efforts resulted in the acceptance of this procedure. To them must be given the gratitude of the world, since they brought a light into this dark region of surgery.[6]

Not many realize the profound influence McDowell's first ovariotomy had upon the entire field of abdominal surgery. An infant nation had startled the world in the fearful and formidable operation of extracting diseased ovaries. There was no precedent to warrant such surgical interference. Yet guided by a correct knowledge of pathology and possessed of trained operative skill, McDowell performed his part well. When the patient recovered, the drama was completed. Ovariotomy was given to the world and the name of the first American surgeon was immortalized on the honor roll of medical history.

THE WARREN FAMILY

The fortunes of war during the struggle for independence resulted in many casualties. For the treatment of the wounded an army hospital was established in Boston. The surgeon was Dr. John Warren (1753–1815). It was his desire to utilize the clinical material of the hospital for teaching purposes. In addition to clinical instruction, he held formal lectures in anatomy. These lectures were attended by Harvard students who were to undertake the study of medicine. Interest was drawn to this instruction by the large quantity of students who visited his lecture hall. The Harvard authorities invited him to lecture at Cambridge as well as to assist them in the founding of a medical school (1780). Dr. John Warren was a younger brother of Dr. Joseph Warren who fell at Bunker Hill. He had served as an army surgeon throughout the war. During the postwar years he attained much eminence in Boston.[3]

John Collins Warren was born in Boston (1778). He was the eldest son of Dr. John Warren and the nephew of General Joseph Warren, who did so much for colonial liberty. Graduating from Harvard College (1797) he read medicine with his father, finally journeying to Paris and London for further study. He graduated from Edinburgh with a doctorate. When he returned to Boston, he began to practice with his father (1802). Four years later, he was made adjunct professor of anatomy and surgery and finally full professor when his father died (1815). He resigned from the chair of surgery at Harvard in 1847.

Among Dr. Warren's greatest accomplishments was the founding of the *New England Journal of Medicine & Surgery* with Dr. Jackson and Dr. Bigelow. He assisted in the formation of the Massachusetts General Hospital and served as its first surgeon from 1820 to 1853. The most famous event in his professional life was the operation he performed under ether on October 16, 1846. This operation demonstrated the value of ether in the advancement of modern surgical anesthesia.[5]

After the death of John C. Warren (1855) his son, Jonathan Mason Warren (1811–1867), continued the family tradition as one of the most renown Bostonian surgeons. Following his graduation from Harvard, he sojourned in Europe. While in London he visited the clinics of Sir Astley Cooper; in Paris he witnessed the work of Dupuytren, Lisfranc and Larrey. Returning to Boston he began to practice (1835). In 1846, he became one of the visiting surgeons to the Massachusetts General

Hospital where he assisted his father in that memorable ether operation. While returning from a meeting of the American Medical Association in New York, the train on which he was a passenger was wrecked (1853). Although he was not actually injured, his health was seriously impaired thereafter until his death (1867).

Jonathan Warren had a son, John Collins Warren, who, like his father, graduated from Harvard (1886). He, in turn, became a professor of surgery and attending surgeon to Massachusetts General Hospital. As editor of the *Boston Medical Journal* he contributed much to surgical literature. At the time of his death (1927) he had served as president of the American Surgical Association.

The family heritage is carried on by his son, John C. Warren, who was an associate professor of surgery at the time of his father's demise. There are few, if any families, to contribute so much to the history of American surgery. No one could seek a more spotless record in the annals of medical history than that presented by the Warren family.[23]

PRE-ANESTHETIC SURGEONS

The years preceding the use of anesthesia is properly termed the rough years of surgery. Surgeons had to be stronger than the patient in order to restrain the subject and defend himself from the patient's outbursts. Too often the surgeon was not able to concentrate his attention upon the surgical task because of the cries and struggles of his patient.

A great surgical pioneer of this period was Valentine Mott (1785–1865) of New York. His many operations are too numerous to relate. Ligating of vessels was his most daring feat. In this dangerous pre-anesthetic and pre-antiseptic era he successfully ligated 138 aneurysms. On one occasion he ligated a common iliac artery through the abdomen (1828). When he was professor of surgery at Rutgers College, he wrote: " . . . we think it may henceforth be regarded as an axiom that it is the duty of a surgeon to operate in every case which allows of a rational hope of success, either of improving the patient's condition or of preserving his life. . . . We do not believe it proper for every man who is nominally of the profession to assume such high responsibilities but that we regard those as surgeons, and those alone, who have, by conscientious devotion to the study of our science, and the daily multifarious duties, acquired that knowledge which renders the mind of the practitioner serene, his judgment sound and hands skillful; while it holds out to the patient rational hopes of amended health and prolonged life.*

Mott was a bold operator, a pioneer teacher of clinical surgery, and one of the earliest professors of surgery in New York. When the Civil War was declared he was an old man. Nevertheless he assembled many valuable notes which he employed to write his excellent monograph on hemorrhage. This treatise was published by the U.S. Sanitary Commission.[2]

Another eminent surgeon was Willard Parker (1800–1885). He was famous for his original surgical technic which attracted many students to Columbia Medical School. Here he was professor of surgery (1839–1860). Among his proficient operations was cystotomy, a procedure which he perfected for the repair of the bladder following rupture or the removal of calculi.

During these formative years in American surgery, a laparotomy was performed by a southern surgeon, Dr. Wilson (1831). This was undertaken for the relief of an intussusception in a negro slave who had an intestinal obstruction for seventeen days. The abdomen was opened and the intussusception released with complete recovery of the patient.

Other interesting surgical undertakings were recorded. Dr. Joseph Glover, of South Carolina, removed part of the spleen, some omentum and ligated a branch of the splenic vessels (1801). A traumatic injury

* Am. J. Med. Soc., vol. III, 1829.

to the spleen due to gunshot wound gave Dr. Alston, of Texas, the opportunity to perform a splenectomy (1863).[8,22]

Elective surgery was not a feature of the pre-anesthesia decades. Surgical intervention was an emergency, life-saving undertaking. Patients were coerced into submitting to surgery, either as a last resort or because their unconscious state rendered objection impossible.

AMERICA'S GREATEST SURGICAL CONTRIBUTIONS

There are two non-surgical subjects which have profoundly accelerated surgical progress: The first is the introduction of anesthesia, and the second is the elucidation of shock. Both these topics are truly American. No other nation can claim priority for the discovery of the former, and no one has contributed more to the understanding of the latter than American surgeons.

A great change has been brought about in the practice of abdominal surgery by the introduction of anesthesia. Patients will now consent to operations which formerly they would rather have died than endure. Thus many new operations which would have been impracticable are now feasible. In this way the range of operative surgery has been greatly extended. By means of anesthesia the patient is liberated from pain and in a great degree from the mental anxiety and disquietude which formerly preceded an operation. This is undoubtedly a contributing factor in di-diminishing the physical shock of an operation.[1]

The discovery of anesthesia produced a bitter discussion as to the real discoverer. Dr. Crawford W. Long (1815–1878), of Georgia, was the first man to use ether as an agent to relieve the pain of surgical operations. In 1847, he administered ether to his own wife at childbirth and continued to use it in his obstetrical practice. Long's classical operation occurred on March 30, 1842. On that day a man named James Venables, while under the influence of ether, had a small cystic tumor removed from his neck. Long did not push himself into the arena as a claimant for the honor of the discovery of anesthesia until 1854. At that time he wrote to Senator Dawson of the U. S. Senate giving him an account of what he had done.[23]

To William T. Morton (1819–1868) is given the credit of demonstrating the practicability of ether anesthesia. Morton graduated from the Baltimore College of Dental Surgery, and entered into partnership with Dr. Horace Wells to practice dentistry in Boston. On September 30, 1846, he extracted a tooth while the patient was unconscious from ether. It was on this day that he spoke to Dr. C. T. Jackson on the subject.

Morton was anxious to receive the approbation of the medical profession on ether anesthesia. He called on Dr. Joseph C. Warren and explained his anxiety in the matter. So it came to pass that Dr. Warren, with Dr. Morton as anesthetist, removed a tumor from the left side of the face of Gilbert Abbott (October 16, 1846).

Among the many other names associated with anesthesia is that of Horace Wells (1815–1848). He was a dentist who observed a young man who had inhaled nitrous oxide bruise himself against furniture without complaining of pain. The next day he gave himself the gas and allowed a Dr. Riggs to pull one of his teeth. He felt no pain (1844). He at once began the manufacture and use of nitrous oxide. Wells attempted to gain priority rights as the discoverer of anesthesia. While the anesthesia controversy was raging he committed suicide in 1848.[23]

One blemish mars the beauty of the anesthesia doscovery. The scar is the altercation for fame among the pioneer anesthetists. It is not of great importance to defend the true discoverer of anesthesia. Suffice it to be acclaimed as a true American discovery; no other nation can question this claim. The incalculable assistance given to abdominal surgery by this dis-

covery cannot be described adequately. This American discovery was the first revolutionary contribution recorded in surgical history. It is a disclosure touching the brim of metaphysics—a safe substance producing anesthesia and inducing sleep. All the influences emanating from the introduction of anesthesia is attributed to it. Thus the progress which abdominal surgery has made from year to year owes its origin to an American discovery.

America's greatest contribution has been surgical anesthesia. Nevertheless there is another contribution, less dramatic perhaps, but none the less highly commendable. The subject of shock has been elucidated largely through the efforts of Americans. No individual beams forth in the unfolding picture on the nature of and treatment of shock, as in the drama of anesthesia.

At the birth of this century the nature of shock was a nebulous enigma. Only the crudest ideas were postulated by surgeons of the world as to the mechanism of shock. All realized how serious and frequent a complication this was following severe injuries and major operations. The world of medicine was eager to listen to some voice in the wilderness which would raise the pall of ignorance. None was heard until George W. Crile (1864–1942) published the results of his investigations (1899). Although his conclusions were not correct, nevertheless his work stimulated others to exert their efforts to solve this perplexing problem.

More recent years produced notable facts which have assisted in clearing the mist surrounding the mechanism of shock. The modern American investigators, Blalock, Keith, Phemister, Moon, Scudder and others have added greatly to our knowledge of this subject. To those other Americans who have studied the problem of combatting shock by employing blood and blood substitutes is due a laurel wreath of unfading fame. Through the efforts of Americans the ever present complication of shock, hardly less important than infection, is on the road to exile from the modern operating theatre.[6]

TRANSITION PERIOD

Between the pre-antiseptic, pre-anesthesia decades and the era of aseptic, analgesic surgery was a period of blending of one with the other. Most important of those surgeons who crossed this bridge of transition was Samuel David Gross (1806–1884). Often called the Nestor of American surgery, he was the foremost American surgeon of his time. Gross invented many new instruments, was a prolific writer, and introduced deep sutures in wounds of the abdominal wall. As a medical historian he wrote a history of American surgery down to the year 1876. In addition, his *System of Surgery* published in 1859 was widely distributed. Dr. Gross was a popular teacher of surgery first at Louisville (1840) then at the Jefferson Medical College (1856). He did more for the advancement of American Surgery than any individual of his day. He was panurgic in his ability. Not only was he an original investigator and proficient operator, but as a teacher and writer he was a notable exponent of his craft.[4]

The most outstanding of the New England Surgeons at this time was Henry Jacob Bigelow (1816–1889). As professor of surgery at Harvard, and surgeon to the Massachusetts General Hospital he achieved fame for the bloodless reduction of the hip joint. So great was his influence in Boston that his words were accepted as dogma. Much is due to Bigelow for his efforts to establish the administration of ether as a permanent part of operative technic. He is well known as a pioneer in genitourinary surgery.

D. Hayes Agnew (1818–1892) was born in Pennsylvania and graduated from that university in 1838. His early days in medicine were as a country doctor. When he moved to Philadelphia, he began to teach in the Philadelphia School of Anatomy (1848). In 1870, he was appointed professor of clinical surgery at the Uni-

versity of Pennsylvania. In the following year he succeeded H. H. Smith as professor of the principles and practice of surgery. He achieved national fame by his attendance of President Garfield during his last illness.

When Dr. Agnew became Professor Emeritus of Surgery, his successor was John Ashhurst, Jr. (1839–1900). He was one of the most learned surgeons of America and a great teacher. Ashhurst, who disdained the use of antiseptics, claimed operative results as regards infection as good as those of the more progressive Agnew. Often his results were unwittingly obtained by observing simple cleanliness.[4] No man ever used his vast experience and profound learning to better purpose in the instruction of those who were to come after him.[11,23]

Another bright star in the surgical heavens was William Williams Keen (1837–1932). As professor of surgery at Jefferson Medical College he was one of the first to perform many surgical procedures. He not only contributed novel innovations to general surgery but invented new technics for sterilizing catgut, and was a pioneer in neurological surgery. He was a noted author, achieving renown for his *System of Surgery*. He wrote an essay on the *Early History of Practical Anatomy* (1870).

James Marion Sims (1813–1883) was not primarily an abdominal surgeon but a gynecologist. Nevertheless his rules of surgery were so influential that general surgeons followed his dictum on penetrating wounds. He maintained that a wound of entrance should be enlarged for adequate exposure; all wounded intestines should be sutured and bleeding vessels ligated; the peritoneal cavity should be thoroughly cleansed of all foreign matter before closing the external wound; the surgeon should decide whether the wound required drainage.

All these former surgeons of the transition period assisted in completing the metamorphosis in American surgery. They were the link which united primitive to modern American surgery. With the passing of these notable figures, America became a leading figure in the world of medical science. In the subsequent decades America is to assume the dominating leadership in the world of surgery.

AMERICAN PIONEERS IN ASEPSIS

When Lister visited the United States at the International Medical Congress held in connection with the Centennial Exposition at Philadelphia, ten years had passed since his doctrine of antisepsis was promulgated (1876). His teachings in America were accepted with indifference.[19]

The reasons for American lethargy in this important aspect of surgery were several: First, the treatment procedure was changed so often that surgeons could not adapt themselves to frequent alterations. Secondly, the procedures advanced were so complicated that the surgeon himself had to be responsible for its proper administration. Lastly, the hostility of so many British surgeons (Nunnelly, Paget, Humphrey, Callender, Tait, etc.) to Listerism minimized its importance to Americans.[27]

In appraising the early history of aseptic surgery in America, scattered apostles of Listerism are seen in several large cities. New Orleans, Chicago, New York and Baltimore were the domiciles of ardent advocates of asepsis.

Hostility to asepsis and skepticism were present among the surgeons of New Orleans. The only exception was a German surgeon, Dr. Moritz Schuppert (1817–?), born and educated in Marburg. As professor of surgery in the Charity Hospital Medical School he championed the cause of antiseptic surgery. In a lecture published in the *New Orleans Medical and Surgical Journal*, Schuppert stated: "Reports that the antiseptic treatment of wounds recommended by Lister promised to cause a revolution in surgical practice, did not permit me to rest, and the Spring of 1875 found me already on the road to visit those places from which such stunning facts

were reported." At the conclusion of this extensive monograph, he summarized his own experiences based on his personal operations in New Orleans at Charity Hospital.

Despite the excellent exposition of the subject by Schuppert, Listerism made very slow progress in Louisiana and the United States. This was due in no small measure to the antagonism of many American surgeons. As learned and progressive a surgeon as Ashhurst was, he wrote in his textbook: "The alleged superiority of the antiseptic method has not yet been demonstrated." This was eleven years after Lord Lister had issued his first announcement of the antiseptic doctrine.[19]

The topic of antisepsis has been an evolution in which several American surgeons were important contributors. To Edmund Andrews (1824–1904) and to Christian Fenger (1840–1902) goes the honor of first using aseptic technic in Chicago. Of the two, Christian Fenger was the more influential.

In the spring of 1878 he began to give lectures and demonstrations in pathology. This was a science unknown to Chicago physicians. Fenger quickly accepted the importance of surgical asepsis and introduced Listerian methods in the Cook County Hospital. After several years as pathologist, he so impressed the surgeons with his surgical knowledge, that he was appointed to the surgical staff at Cook County Hospital. Finally, in 1889, he was elevated to the surgical professorship at Rush Medical College.[14] Fenger was the first American surgeon to prove by autopsy the importance of aseptic technic. Necropsies before the acceptance of the principles of asepsis and antisepsis in surgery often disclosed not the disease from which the patient suffered during life but the complications that had caused death.[14]

Arpad G. Gerster (1848– ?) was born in Hungary and educated abroad. He came to America and settled in New York. As an accomplished surgeon he was an attending surgeon at the German and Mt. Sinai Hospitals. He was the first man in New York to practice surgery exclusively. In 1888, he published "The Rules of Aseptic and Antiseptic Surgery." This essay enjoyed a wide circulation, even as it stimulated surgical asepsis and an appreciation of abdominal surgical diseases.[8]

The most startling American contribution to aseptic technic occurred in 1890. William S. Halsted introduced the use of sterile rubber gloves by surgeons and his assistants in the operating room. The employment of "the boiled hands" brought about a radical change in surgical technic. The beneficial results of this contribution cannot be overestimated.

The development of surgical asepsis is indicative of the universality of the medical art: it was introduced by an Englishman and was adopted and advanced by continental nations. An American surgeon by the utilization of rubber gloves not only gave greater security to the manipulations of surgery, but protected the surgeon's hands from the harshness and injurious effects of chemical antiseptics. This is an example of how American surgeons have transformed the picture of modern surgery so that it no longer possesses its former appearance.

PERIOD OF REORGANIZATION

The postwar years of 1865 to 1898 in the United States were termed the reorganization period. For it was during these years that America turned to the reunion of the states, healed its wounds and accepted the new changes produced by the industrial revolution.

The effects of reorganization found its way into medicine. Prior to this period there was no central collection of medical literature and no method available for ascertaining what scientific material had been published. The Library of the Surgeon General's Office was a small collection of books which were inadequate. To John Shaw Billings (1838–1913) was given the task of reorganizing the medical literature of America.

As an army surgeon Billings has been termed one of its foremost medical officers (Hume). During the Civil War he rendered distinguished service at Chancellorsville and at Gettysburg, where he operated for three days without rest. He was the first American surgeon to resect successfully the ankle joint (1862). His history of American surgery is the best in the English language.

After the Civil War, Surgeon General Hammond gave Billings the assignment of directing the Library of the Surgeon General's Office. Billings had the foresight to recognize the need of a large library for the advancement of American surgery and medicine. Since his day this library, now known as the Army Medical Library, has become the largest in the world. Although this is not a true contribution to abdominal surgery, as many others already mentioned, nevertheless, the realm of books is an essential part of the surgeon's armamentarium. For to paraphrase Osler, the surgeon who does not read books is like the captain who goes to sea without a knowledge of navigation.

Billings realized that a mass of books with no catalogue would be like an auto without a steering apparatus. Thus he devised the *Index Catalogue*, the largest compendium of bibliography ever developed (1880). He also founded the *Index Medicus*, now called the *Quarterly Cumulative Index Medicus*, which supplements the great catalogue.[11]

As a bibliographer, Billings achieved world fame and honorary degrees from European universities. At the time of his death he was the best known American surgeon to European scientists.[17]

THE AMERICAN SURGICAL DISEASE

A surgical disease which is truly American from the point of view of frequency of occurrence in Americans, and the elucidation of its pathology and cure, is appendicitis. Before the American surgeons solved the riddle of appendicitis, the abdomen was forbidden territory, and the operative treatment awaited its destined birth.

American surgery again enrolled itself upon the honor roll of everlasting fame by the exposition of the vermiform appendix. The first step in the recognition of appendicitis was taken by George Lewis, of New York, (1856). Then followed the operation of Willard Parker (1800–1884) for perityphlitic abscess, which was simply an evacuation of the abscess (1867). Subsequently the removal of the appendix was accomplished by R. J. Hall, of New York, and Thomas G. Morton, of Philadelphia.

For the complete understanding of this lesion, all honor goes to Reginald Heber Fitz (1843–1913), of Boston. The indications for surgical treatment were definitely expounded in 1889 by Charles McBurney (1845–1913), of New York.

The story of appendicitis unfolds during the last half century. "First the disease had to be recognized and that takes us back to the Massachusetts General Hospital. Here young Fitz, recently returned from study under Virchow, was made Keeper of the Pathological Cabinet at the hospital. For some reason he became interested in what was commonly called typhlitis and perityphlitis. Soon he convinced himself that the appendix was the cause of this condition and that it was an unnecessary organ of the human body. Finally, when the Association of American Physicians was to hold its first meeting in June, 1886, he was scheduled to read his paper. This was entitled, "Perforating Inflammation of the Vermiform Appendix; with Special Reference to its Early Diagnosis and Treatment."[9,10]

At this meeting Fitz showed by comparison of many cases that perityphlitis and perforating appendicitis were the same pathological condition. In addition he outlined the main symptoms and used the name appendicitis for the first time.

While Fitz was telling the surgeons what they ought to do, European surgeons continued to treat the disease conservatively.

In America his advice was accepted, and the world began to hear of McBurney, Murphy, Senn, Sands, Fowler and Ochsner.

As previously mentioned Dr. Hall successfully removed an inflamed appendix. However, this operation was undertaken for what was thought to be an incarcerated inguinal hernia. When the hernial sac was opened, peritonitis due to a gangrenous appendix was found. In 1887, Thomas George Morton (1835–1903) diagnosed appendicular disease, operated, opened an abscess and removed the appendix with a successful result. This was the first successful appendectomy in which the operation was primarily undertaken for a diseased appendix.[7]

However, the great advancement in the early diagnosis and operative interference in appendicitis was due to the efforts of Sands and McBurney. Henry B. Sands (1830–1888) was the assistant of Willard Parker from 1867 to 1870; from him he learned how to open a perityphlitic abscess. Sands is entitled to remembrance because he taught surgeons how to recognize the early signs of perforated appendicitis and advocated early operation.[7]

To the work of Sands was added the efforts of Charles McBurney (1845–1913). His paper published in 1889 established by clinical experience the utter necessity for early operation in appendicitis.[7] He insisted that there was a specific area especially tender in cases of appendicitis. What is now known as McBurney's point was described thus: ". . . the seat of greatest pain determined by the pressure of one finger, has been very exactly between an inch and a half and two inches from the anterior spinous process of the ilium on a straight line drawn from that process to the umbilicus."[20] From that day (November 13, 1889) the early operation for appendicitis as taught by such surgeons as Murphy and Senn became customary in America.

Other important therapeutic measures were instituted by Americans. Alonzo Clark (1807–1877), of New York, introduced the use of opium in peritonitis (1885). Another New Yorker, George Ryerson Fowler (1848–1906), advocated the sitting up position for cases of peritonitis. Thus inflammatory exudates would flow into the pelvis where absorption is not as rapid and drainage could be accomplished more satisfactorily.[7]

A new era was born in the field of abdominal surgery. Operations for the cure of appendicitis are performed daily. To this new surgery, American ingenuity was the major asset. Our nation achieved a brilliant triumph in this phase of abdominal surgery. To American surgeons perennial tribute must be given for initiating appendectomy and for perfecting its technic.

PATHFINDERS IN BILIARY AND GASTROINTESTINAL SURGERY

Less notable than the story of appendicitis but equally as important is the history of American surgery of the biliary and gastrointestinal tracts. Early surgery of these vital structures began with the repair of intestinal wounds. Later resection of the intestine, followed by anastomosis was perfected.

Intestinal wounds stimulated the interest of American surgeons as early as 1805. This subject was the inaugural treatise of Dr. Thomas Smith at the University of Pennsylvania. Samuel Gross, in 1843, experimented on dogs as to the nature and treatment of these wounds. Later he applied these results to actual practice. J. Marion Sims corroborated the method of Gross. This involved the excision of a section of the intestine with suturing of the divided ends. Gross never performed this procedure. It was in 1863 that Dr. Kinloch, of South Carolina, accomplished this result. However, it remained for Dr. N. T. Bull to make the practice safe. The efforts of Nicholas Senn and Abbe in intestinal anastomosis deserves distinction.

Other efforts were made in gastrointestinal surgery, however, most of these are

scattered reports. For example, in 1834, Luzenberg opened a strangulated hernia and excised the gangrenous bowel. The patient recovered.[22] *The Boston Journal of Medicine* of June 23, 1845, contains an article by a Dr. Manlore. This account reports a laparotomy for obstruction. An involuntary ileostomy was performed because the bowel was adherent to the abdominal wall. The author advocated this procedure in all cases of volvulus and intussusception.[5]

This same journal of July 23, 1868, contains a report by Dr. R. Wilder on "strangulation of the large intestine by a band." In this case he opened the abdomen, released the band with immediate relief. Five years later, Cheever reported a similar case with complete recovery of the patient.[5]

On September 23, 1885, an unfortunate man swallowed a denture with four teeth. It lodged in the esophagus. When he entered the hospital three days later, it was behind the sternum. The patient could not eat and lost much weight. A young surgeon, Maurice Richardson, opened the abdomen and stomach. He reached through the cardia up into the esophagus. With difficulty he liberated and delivered the denture. This procedure was the first of its kind to be reported.[5]

During these years sporadic successes with laparotomy, for various causes, found their way into the literature. The first and only successful laparotomy for the relief of perforation of the intestine due to typhoid fever is attributed to Dr. W. Van Hook, of Chicago. Laparotomy for the relief of purulent peritonitis was performed by Mears, of Philadelphia. This procedure was among the first in which the peritoneal cavity was opened for the purpose of draining the cavity. In association with this topic other names are prominent. Commendation must be given to Hartley, Curtis, Stimson, Morton and Vanderveer.[8]

The question of suture material fascinated American surgeons. Henry O. Marcy, of Otis, Massachusetts, introduced antiseptic ligatures in the radical cure of hernia, using kangaroo tendon (1878). Fourteen years later, Robert Abbe (1851– ?) introduced catgut rings in intestinal surgery. One of the most ingenious and useful suture in intestinal surgery is the Connell suture. This was devised by Gregory F. Connell (1875–) now of Oshkosh, Wisconsin.[7,8]

Surgery of the stomach was advanced at the hands of Americans. Christian Fenger unfolded new facts on cancer of the stomach. The first man to take a radiogram of the stomach and confirm his findings surgically was John Conrad Hemmeter (1896). In addition he was a pioneer in duodenal intubation.[8]

On May 5, 1898, Dr. Charles B. Brigham reported a successful gastrectomy in the *Boston Medical Journal*.[5] He removed the entire stomach for cancer. An anastomosis was then made between the esophagus and the duodenum by means of a Murphy button. Two other names are prominently attached to the technic of gastrectomy both for cancer and ulcer. These men, both New Yorkers, are Albert Ashton Berg (1872–) and the late beloved George David Stewart (1862–1933).

Preoperative care of the gastrointestinal tract was emphasized for the first time by an American (1900). It was through Harvey Cushing that surgeons realized the possibility of rendering the stomach and intestines sterile as a preparatory measure to operations.[21]

Abdominal surgery of infancy and childhood has been promoted by American surgeons. Among these men are: C. L. Scudder, E. J. Donovan, William Ladd and Robert Gross. Through these surgeons and others pediatric surgery has become a specialty within the specialty of abdominal surgery.

One of the aspects to the explanation for the enviable surgical position America has reached is her contribution to gastrointestinal surgery. In this phase of abdominal surgery, America displayed the inherent characteristic of a young nation; first, to

equal, then to excel the accomplishments of older nations.

This characteristic was further demonstrated in biliary surgery. In colonial days, John C. Warren excised biliary calculi by incision into the umbilical vein.[5,23] At the University of Indiana, Dr. John S. Bobbs was dean of medicine. He is the founder of cholecystotomy. On June 16, 1867, he opened a patient's gallbladder and extracted fifty calculi.[26] The next year witnessed a similar performance by J. Marion Sims. In 1879, Robert Lawson Tait (1845–1899), of Alabama, perfected cholecystotomy.[11]

Dr. Fenger became interested in diseases of the biliary system. This was due to Phineas Conner, of Cincinnati, who incised adherent suppurating gallbladders and removed gallstones. Thus it was that Fenger explained the ball-valve action of biliary calculi and their relationship to the production of jaundice.

The last decades of the nineteenth century produced additional data on the biliary system. W. B. Davis, of Alabama, did excellent work on the anatomy and surgery of the biliary ducts (1890). More difficult surgery was now attempted by American surgeons. On March 23, 1893, G. W. Jones reported making an anastomosis between the gallbladder and intestine for stricture of the common duct.[5] Five years later Halsted excised the ampulla of Vater and the papilla of the common duct because of cancer. A successful implantation of the common duct into the duodenum for the relief of stricture was reported, in 1908, by Horace W. Packard.[6]

Bile duct surgery continues to receive the greatest attention from American surgeons. Such interest has given birth to the use of vitallium tubes in biliary surgery. The pioneer in vitallium surgery of these structures is Herman E. Pearse, of Rochester, New York. Other surgeons to follow his leadership were: Howard M. Clute, of Boston, Ben Seaman, Russell Fowler and John Raycroft all of New York.

The remarkable work in biliary surgery typifies the courage of American surgeons. Their ability to undertake a new project with the utmost vigor and enthusiasm is here manifested. Self-reliance such as this has developed the art of surgery in America and has obtained for our nation the admiration of the civilized world.

THE PEERLESS SURGEONS

"Progress always rests upon a small number of men of genius. Thus we have in the science of surgery in every epoch and every country, a certain number of renowned men who are the causes and pillars of this achievement." (Wm. J. Mayo.) Progress in American surgery was accelerated by several men of genius. Although many generations are represented, only the most famous characters will be recalled to mind in this surgical saga of our own native land.

Among the pioneer surgeons of the Middle West was Nicholas Senn (1844–1909). Born in Switzerland, he came to America (1852) and settled in Chicago. As an early exponent of scientific and experimental surgery, he concerned himself with abdominal surgery. He devised a method of detecting intestinal perforation with hydrogen gas (1888). The merits of Senn were in stressing surgical technic and in experimental abdominal surgery. He was among the first experimenters in gastroenterostomy and bowel anastomosis. For intestinal anastomosis he used decalcified bone plates. Senn was the founder of the Association of Military Surgeons of the United States (1891). From 1905 to 1908 he was editor of *Surgery, Gynecology & Obstetrics*. At one time he was professor of surgery at Rush Medical School.

The work of Senn led naturally to the accomplishments of John Benjamin Murphy (1857–1916). One of America's own world acclaimed surgeons, Murphy is remembered especially for the "button" which bears his name. The Murphy button is a great aid in intestinal anastomosis. His fame in America is associated with the

founding of the American College of Surgeons.[18]

A more recent leader of Midwest surgery was Albert J. Ochsner (1858–1925). For five years he was Senn's chief-of-staff, and began in this clinic his distinguished work known as Ochsnerization. This is the treatment of appendicitis when operation is not advisable or available.

At the turn of the century two master surgeons enjoyed positions of eminence. These men were Deaver, of Philadelphia, and Halsted, of Baltimore. John Blair Deaver (1855–1931) was one of the most skillful operators of this period. He was an exponent of what he called "living pathology." The egregious character of his work is illustrated in his writings on: *Appendicitis* (1896), *Prostatic Hypertrophy* (1905), *The Breast* (1917), and a *Surgical Anatomy* (1901), in three volumes.[4]

An expert in the art of healing was William Stewart Halsted (1852–1922). As first professor of surgery at Johns Hopkins, he was a quiet but effective force in molding American surgery into a composite science. In addition to his introduction of sterile rubber gloves, he was a pioneer in the use of silk ligatures and cocaine infiltration anesthesia. He devised numerous operative procedures, such as those for radical mastectomy (1889) and herniorrhaphy. If any one man is to be given credit for initiating specialism in surgery, it is Halsted. He trained men who eventually became masters in different branches of surgery. During an all star operation, Halsted would operate with Cushing, Finney, Bloodgood, Young and Baetjer as assistants. Each of these assistants achieved deserving fame, some of whom pioneered in other branches of surgery. To these surgeons he taught the delicate art of the perfect healing of wounds, which was masterly demonstrated at his clinics.[11]

Halsted showed the necessity for the gentle handling of tissues as a corollary to the prevention of wound infections for the protection of patients against surgical shock. To him all honor is due for the abolition of the rough and ready surgery which was prevalent before his day. Americans are justly proud of Halsted; he not only developed the science of surgery but cultivated its art as well.

The late George Washington Crile (1864–1942), of Cleveland, was known for many ingenious contributions to surgery. His experimental and clinical investigations of surgical shock and the reduction of operative shock by his procedure of "anoci-association" brought him to the attention of the medical profession. He achieved national fame for his technical ability of denervating the adrenal gland as well as for thyroidectomy.

All the world has heard of the Mayo Brothers. Their exceptional dexterity as surgeons, teachers and contributors to medicine made their names universally familiar. Founders of the world famous Mayo Clinic in Rochester, Minnesota, William James Mayo (1861–1939) and Charles Horace Mayo (1865–1939) were the authors of many accepted improvements in visceral surgery. By the establishment of their clinic they have opened the way for future discoveries in surgery. Many surgeons have been trained at the Mayo Clinic, and by their work have reflected honor and glory on the memory of Charles and William Mayo.[4] Among these master abdominal craftsmen mention is made of: E. Starr Judd (1878–1935), Donald C. Balfour, Waltman Walters and Fred Rankin. Today the Mayo Clinic is the post-graduate medical school of the University of Minnesota. At this university Owen H. Wangensteen is professor of surgery. He is noted for his remarkable work on intestinal obstructions. His book on that subject has been accepted as a classic and is destined to be one of the most valuable books in American medical literature.

The influence of the Mayo Clinic has been manifested in a different manner. Other clinics formed according to the Mayo pattern have been established in America. The most noted of these small

institutions is the Lahey Clinic, in Boston, founded by the distinguished surgeon, Frank Lahey. Here under the guidance of Lahey and Richard B. Cattell, young surgeons, through a system of fellowships, are trained in the flawless technic of graceful surgeons.

The accomplishments of these peerless surgeons must be evaluated according to the standards of the period in which they lived. They were influential during a definite period of American surgical growth and development. There will never again be men of their caliber. This is not because similar personalities may not be born, but because the era in which they lived will never again be duplicated in America.[14]

CONCLUSIONS

Following the adoption of asepsis and anesthesia as definite supplements to surgical technic, America was contented to follow the established principles inherited from the old world. Later generations progressed beyond European influence to become pathfinders in abdominal surgery. America is now the seat of learning to which surgeons of the world may come for knowledge. This century finds the American surgeon the leading figure in the realm of surgical practice, progress and prestige.

This exalted position has been attained for many reasons. Among these are the generous allowances made by universities and private individuals for the study of experimental and clinical surgery. In addition, America has been liberal in remunerating deserving surgeons for their ability.[4] Another reason has been the impartiality with which American surgeons gleaned the harvest from European discoveries. America eagerly seized the surgical contributions of England, France and Germany. Thus America appropriated to her own use whatever principles, theories, discoveries, inventions or knowledge Europe had to offer. With this adaptability for assimilating proffered knowledge, American surgeons, adding their own observations, contributed generously to the resources of surgery.[13]

Not only have American surgeons aimed to reach the acme of perfection, but they have examined themselves in order to maintain that supremacy. "This is reflected in the facilities for long term specialized education of the young surgeon. The high standards set for certification by the American Board of Surgery have been a very stimulating influence in maintaining the high level of surgical practice. The influence of the American College of Surgeons has assisted in improving surgical practice throughout the nation due to the increased standards for admission to fellowship."[13]

With the advent of a proper pathological basis for understanding disease, the American surgeon quickly accepted the need for training in pathology. This was a radical departure since hitherto surgeons relied primarily on anatomy as a basis for surgical proficiency. In the present century American surgeons have advanced further. They have added normal and pathological physiology to their knowledge as a requisite for surgical excellency.[4]

America has set high qualifications for the perfect surgeon: "He must be a physician possessed of the high ideals of a Hippocrates, the anatomical knowledge of a Vesalius, the alertness and fearlessness of a Paré, the intuitions and curiosity of a Hunter, the imagination of a Pasteur, and the industry and honesty of a Lister. To these must be added the good judgement which marks the difference between technical efficiency and true ability."[12] The essential ingredients, however, in the make-up of the surgeon are the mental, the moral and the mechanical. "The first has to do with knowledge, the second with judgement, and the third with skill. In such order they provide the why, the whether, and the how of every surgical question. The American surgeon recognizes this trinity of attributes and happy indeed is he—and rare in the extreme—who may possess them all in equal degree."[24]

These troubled days of war, commercialism, and social complexes welcome the ideals and aspirations of the medical scientist. "The commercial world exalts those who accumulate wealth; the politician defies the narrow-minded nationalist; and the unthinking citizen finds his hero in the theater. Surgery engrossed in scientific investigation and its application to the relief of human suffering, reserves its insignia of greatness for those who find their satisfaction in service and in the search for the elusive secrets which benefit mankind. The American surgeon, in common with all scientists, loves to wrest from nature its secrets for the pure joy of increasing knowledge. He may be oblivious of its immediate application, but he is confident of its ultimate value in alleviating human suffering."[16]

The turbulent era through which we are passing threatens to stifle surgical progress. "All other continents have forgotten the advancement of surgical science because of the war. The post-war years will be more occupied with reconstruction, than surgical prestige. Therefore, the preservation of present surgical standards and the energy for progress must arise from America."[13] Thus when a future historian of surgical history evaluates America, he can write that American surgeons have not only been illustrious pioneers in their specialty, but have also preserved, protected, and advanced it during the most critical period of its existence.

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