

PART I

HISTORY

CHAPTER 1

Historical Milestones in Female Pelvic Surgery, Gynecology and Female Urology

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ON THE SHOULDERS OF GIANTS

From the earliest days of recorded medical history, physicians struggled with the problems of pelvic organ prolapse, urinary incontinence and vesicovaginal fistula. An inadequate understanding of pelvic anatomy plagued practitioners prior to the nineteenth century. Ignorance of asepsis, the absence of anesthesia, faulty suture materials, inadequate instrumentation and suboptimal exposure delayed any consistent success until the mid-nineteenth century.

The evolution of pelvic surgery from the Hippocratic Age to the Antiseptic Period is a fascinating one in which original theories occasionally fell from favor only to be

resurrected and popularized by subsequent generations. Equally intriguing is the development of a wide array of innovative instrumentation and materials that often paralleled many surgical advances. This chapter is an attempt to touch upon the milestones that occurred along the way and to pay homage to the pioneers who helped shape a specialty and upon whose shoulders we stand. The author's selection of important milestones in our specialty up to 1961 is shown in Table 1-1. Note that this chapter emphasizes American contributions and milestones that influenced contemporary thought, patient care and surgical practices. We are grateful for the works of Dr. Thomas Baskett, Dr. James V. Ricci and particularly to Dr. Harold Speert whose extensive research on the subject made this chapter possible.

GYNECOLOGY IN ANTIQUITY

Gynecology in antiquity finds its roots in the Ebers Papyrus (1500 Before Common Era, BCE) that portrayed the uterus as a wandering animal, usually a tortoise, newt or crocodile, capable of movement within its host. Hippocrates perpetuated this animalistic concept, stating that the uterus often went wild when deprived of male semen. He provided the earliest description of a pessary employing a pomegranate to reduce uterine prolapse and used catheters fashioned from tin and lead to irrigate and drain the uterus. The seven cells doctrine of the Common Era (CE) replaced the animalistic concept, depicting the uterine cavity as being divided into seven compartments whereby male embryos developed on the right, females on the left and hermaphrodites in the center. Similar notions remained popular until the Middle Ages. Soranus of Ephesus (CE 98 to 138) is commonly considered the foremost gynecologic authority of antiquity.

He described the uterus based on human dissection and performed hysterectomy for uterine prolapse. His writings provided the foundation for gynecologic texts up to the seventeenth century.

The ancients employed instruments fashioned from tin, iron, steel, lead, copper, bronze, wood and horn. Those made of iron and steel were likely quite popular but very few survived the oxidation of more than two millennia. Gynecologic instruments including forceps, catheters, scalpels as well as massive bivalve, trivalve and quadrivalve vaginal specula from the first century BCE were unearthed at Pompeii.

MEDIEVAL MEDICINE

The Dark Ages and Medieval Period (CE 476 to 1453), from the Fall of Rome to the Goths to the Fall of Constantinople to the Turks, is often referred to as the “Age of Faith” or “Era of Monastic Medicine” in which confidence in any one individual was replaced by divine trust. As such, Saint Benedict, founder of the Benedictine Order, encouraged his monks to tend to the sick, but forbade any formal study of medicine. The struggle against leprosy, plagues and prostitution were the focus of the day and little was added to the fund of medical knowledge. Little surgery took place during the period and the majority of physicians were itinerant practitioners, many of whom were quacks and charlatans.

THE RENAISSANCE

The Renaissance Period was marked by the rebirth of individualism and the release from the ban of authority. The rise of universities, the printing press and the subsequent emergence of self-education elevated medicine to the next level and provided for a more clear understanding of female anatomy. Leonardo da Vinci (1452-1519), founder of iconographic and physiologic anatomy, provided the basis for modern anatomic illustration. His illustrations of female pelvic anatomy provide the earliest accurate descriptions of the fetus *in utero*. Unfortunately, his sketches were seen by only a few of his contemporaries and were not published until the end of the nineteenth century.

The first authenticated report of vaginal hysterectomy was given by Giacomo Berengario da Capri (1470-1550) in 1521. He described two cases: one performed by him in 1507 and the other by his father. Ambrose Paré (1510-1590), a renowned military surgeon of the period, was the first to introduce vascular ligatures for hemostasis in place of cautery. However, the use of ligatures was not popularized until Sir Joseph Lister (1827-1912) introduced a longer lasting aseptic suture in the mid-nineteenth century.

Andreas Vesalius (1514-1564) commissioned Jan Stephen van Kalkar to produce the most famous anatomic illustrations of all time, revolutionizing the science of anatomy and the manner in which it was taught. Among the first to successfully challenge the teachings of Galen of Pergamon, he asserted that the physician, to learn his art, must perform cadaver dissection firsthand. Hence, Vesalius made human dissection a viable and respectable profession. His illustrations provided an accurate description of the entire female urogenital tract and its vasculature, depicting the left ovarian vein entering

the left renal vein for the first time. Distinguished pupils of Vesalius include Gabriele Falloppio (1523-1562) who provided the earliest accurate description of the human oviduct and who described the clitoris as a vasomuscular structure. Another pupil was Matthaeus Realdus Columbus (1484-1559) who is credited with the earliest use of the term “labia,” which he considered essential in protecting the uterus from dust, cold and air. Lastly, his student Bartholomeo Eustachio (1520-1574) furnished the earliest accurate delineation of the uterine cavity and cervical canal.

Among the more comprehensive accounts of sixteenth century gynecologic surgery is Caspar Stromayr’s *Practica Copiosa* that contains beautifully executed watercolors depicting diseases of women. Included are illustrations of the examination of uterine prolapse and placement of a pessary comprising a sponge bound by twine, sealed with wax and dipped in butter (Figs. 1-2 and 1-3). Despite the many advances regarding pelvic anatomy during the Renaissance, the approach to most gynecologic problems changed very little from that which was popular during the classical period.

THE SEVENTEENTH CENTURY

Throughout the seventeenth century, theories regarding physiology, generation and anatomy were clarified. Reinier de Graaf (1641-1673) described ovarian follicles and uterine fibroids and provided the first accurate account of the ovary’s gross morphology, anatomic relations and function. Pelvic surgery and instruments of the period are nicely portrayed by the engravings of Johannes Schultetus (1595-1645) in his *Armamentarium Chirurgicum*. He was the first to employ a series of illustrations to provide a stepwise account of surgical procedures (see Fig. 1-4). Included are examples

of treatment of imperforate hymen, hematocolpos, clitoral hypertrophy and the use of a T-binder following vaginal surgery.

THE EIGHTEENTH CENTURY

The eighteenth century is best characterized by the constant conflict that occurred between old and new ideas. As such, relatively few advances occurred in medicine while numerous notable contributions were made in the fields of natural philosophy including microscopy, physics and biology. Surgery during the century began to rise above the skills of an individual surgeon with the founding of surgical societies and the publishing of various medical journals. Physicians, however, remained under close public scrutiny at the hands of popular medical caricaturists such as Thomas Rowlandson (1756-1827). Many outstanding contributions were made toward the understanding of pelvic anatomy during the period. In 1737, James Douglas (1675-1742) gave the first adequate description of the peritoneum, which helped to pave the way to retroperitoneal surgery and the concomitant decrease in peritonitis that typically plagued abdominal procedures of the day. Later, in 1774, William Hunter (1718-1783) completed his monumental work – *Anatomy of the Gravid Uterus*. Thanks to the artistic talent of Jan van Rymdyk many regard this work as the finest anatomic atlas ever produced, as Choulant stated “Anatomically exact and artistically perfect”. Vaginal specula continued to evolve with a modification in 1727 by René-Jacques Croissant de Garengot (1688-1759) who devised blades with a distinctly concave surface. de Garengot used the speculum for vaginal examinations and to differentiate the various “vaginal hernia” (presumably cystocele and rectocele) as Ricci described (Fig. 1-5).

THE NINETEENTH CENTURY PRIOR TO THE ASEPTIC AGE

Prior to the nineteenth century, surgical attempts at managing uterine prolapse and cervical disease were, for the most part, limited to amputation of the cervix. In 1813, Conrad Langenbeck (1776-1851) performed the first planned and successful vaginal hysterectomy. Moreover, he did so alone and without the benefit of anesthesia, as Baskett noted, “At one point Langenbeck was left clutching the bleeding area in one hand and holding one end of the ligature in his teeth while tying the other end with his right hand”.

In America during the first half of the nineteenth century, prior to the aseptic age physicians made several advances. Ephraim McDowell (1771-1830) performed an ovariectomy in 1809; William Potts Dewees (1768-1841) published the first American textbook on gynecology in 1826; and James Marion Sims (1813-1883) (shown in Fig. 1-6) described the treatment of vesicovaginal fistula in 1838. The first successful operation for vesicovaginal fistula employed lead suture and is believed to have been performed by a Virginia gynecologist, John Peter Mettauer (1787-1875) in August of 1838. However, the first published report of an acceptable result did not appear until a year later when George A. Hayward (1791-1863), unaware of Mettauer’s success and using silk for his repair, performed eight operations at the Massachusetts General Hospital, which resulted in only two cures. Mettauer is also credited with the introduction of metallic suture and a retention catheter.

Surgical instruments manufactured during the pre-septic era, which finally came to a close around 1890, were nothing short of extraordinary in terms of variety and

beauty. “Surgical instruments made before 1890 exhibited standards of workmanship, fit, finish and overall artistry that were later sacrificed in the production of aseptic instruments. Moreover, instruments of the earlier period frequently incorporated rare and beautiful materials in their design, including ebony, tortoise shell, ivory, agate, gold and silver” per Edmonson. Among the most notable examples was the vaginal speculum that continued to evolve with literally hundreds of modifications by inventors in an attempt to enhance exposure. Manufacturer Charriere introduced a novel form designed for use as a bivalve, tri-blade or four-blade speculum (Fig. 1-7) in 1838. The more familiar “duckbill” design, still used by clinicians today, was initially put forth by Edward Gabriel Cusco in 1870. However, the most popular speculum currently in use was designed by T.W. Graves, a general practitioner from Massachusetts, and was introduced more than a century ago in 1878.

In 1845, Sims began a series of surgical experiments on his now legendary slaves, Anarcha, Betsy and Lucy, who suffered from vesicovaginal fistulas. After nearly 40 fruitless attempts at fistula repair, over the course of six years, Sims finally succeeded. His triumph was due in part to his use of silver sutures and the exposure afforded him by a speculum of his own design employed with the patient in his knee-chest position. Sims originally reported on his technique in January of 1852 and then more formally in *Silver Sutures*, his 1857 discourse before the New York Academy of Medicine. An immodest man, Sims declared, “silver as a suture is the greatest surgical achievement of the century.” In a subsequent narrative, Sims described the events surrounding his conception of the “Sims knee-chest position” (Fig. 1-8):

“Full of thought I hurried home and the patient (with the vesicovaginal fistula) was placed in the position described, with an assistant on each side too elevate and retract the nates. I cannot, nor is it needful to describe my emotions, when the air rushed in and dilated the vagina to its greatest capacity, whereby its whole surface was seen at one view, for the first time by any mortal man. With this sudden flash of light, with the fistulous opening seen in its proper relations, all the principles of the operation were presented to my mind... and thus, in a moment, in the twinkling of an eye, new hopes and aspirations filled my soul, for a flood of dazzling light had suddenly burst upon my enraptured vision, and I saw in the distance the great and glories triumph that awaited determined and persevering effort. I thought only of relieving the loveliest of all God’s creations of one of the most loathsome maladies that can possibly befall poor human nature... Full of sympathy and enthusiasm, I found myself running headlong after the very class of sufferers that I had all of my professional life most studiously avoided.”

Although one may argue that Sims was not the first to employ silver sutures in surgical repairs, most will concede that he was the first to combine the essentials for cure and thus popularize one of the first major innovations in pelvic surgery. Within the same decade, Washington Lemuel Atlee performed a myomectomy in 1844 and Walter Burnham conducted the first successful abdominal hysterectomy in 1853.

THE MID-NINETEENTH CENTURY: THE DAWN OF ASEPTIC SURGERY

During the second half of the nineteenth century, the requisites for advancement of surgery began to fall into place. These included adequate anesthesia, antisepsis and acceptable suture materials. Throughout the latter half of the century, the evolution of

pelvic surgery gained momentum, as advances in gynecologic therapy were unparalleled in the entire realm of medicine. For more than two millennia, therapy was primarily medical and in less than half a century, it became surgical and spectacular.

The rapidly increasing frequency of successful surgery was made possible by the advent of adequate anesthesia in 1846, Joseph Lister's treatise on asepsis in 1867, and his introduction of aseptic suture (silk soaked in carbolic acid) in 1869. The extraordinary range of pelvic surgical techniques performed prior to the last quarter of the nineteenth century is beautifully illustrated in Jean-Baptiste Marc Bourgery's (1797–1849) and Nicolas Henri Jacob's (1782-1871) magnificent *Traite complet de l' anatomie comprenant la medicine operatorie* 1831-54. "In the entire literature of medicine during the nineteenth century there is nothing that compares with the 749 hand-colored folio-sized lithographs, nearly all of which are in the very realistic style of Nicolas Jacob." As state in Roberts and Tomlinson's – *Fabric of the Body*. Fig. 1-9 shows an example of Bourgery's work illustrating Sims' operation for vesicovaginal fistula.

The latter half of the century is marked by many noteworthy contributions to pelvic surgery and an improved understanding of pelvic anatomy. Anders Adolf Retzius (1796-1860) defined the boundaries of the prevesical space in 1849. In 1877, Leon Clement LeFort (1829-1893) described his procedure for partial colpocleisis, which continues to provide a simple and safe way to manage uterine prolapse in the high risk patient. Alwin Mackendrot (1859-1925; Fig. 1-10) elegantly described the cause and cure of uterine prolapse in 1895 and put forth an accurate description of the pelvic connective tissue including the transverse cervical or cardinal ligaments (Mackendrot's ligaments) (Fig. 1-11).

Soon thereafter, Archibald Donald (1840-1908) and William Fothergill (1806-1879) developed the Manchester operation, uniting parametric and paravaginal tissues to one another and with the cervix anteriorly to effectively counter uterine prolapse. The procedure, named after their hometown, became the first widely used procedure for uterovaginal prolapse. Due to a high birth rate and the large work force performing the manual labor of sheep shearing outside Manchester, England, there was no shortage of young women with pelvic organ prolapse. Rather than use a pessary, Donald primarily resuspended the uterus with a plication of the cardinal ligaments. He performed an anterior colporrhaphy with wide lateral exposure, suture plication of the cardinal ligaments in front of the cervix to elevate the cervix, amputation of the cervix as needed, and posterior colporrhaphy. Donald emphasized that the key to restoring anatomy was “that the raw surface, anterior or posterior, or in exceptional cases, both, must be high, wide, and deep, and that the deep tissues, triangular ligament, or levator ani muscles must be brought together...” From an architectural point of view, Donald believed in maintaining the uterus as the keystone of the pelvic arch for vaginal support. This operation was also much safer since the uterine arteries were not transected decreasing the risk of hemorrhage, and the cul-de-sac was not entered to decrease the risk of intra-abdominal abscess or peritonitis.

In 1888, Donald met Fothergill in Manchester, where they collaborated on improving the surgery. Fothergill felt that the severity of prolapse was related to failure of the parametria, which we know today as the cardinal ligaments. He felt that vaginal surgery would be ideal to “alter the attachment of prolapse...in such a way as to ‘take up the

slack' in some degree." Fothergill was a proponent for trachelectomy in all patients with cervical elongation "more than three inches in length." The cardinal ligaments were plicated using "deep buried stitches" of silver suture at first, and then chromic catgut after Donald visited German physicians who preferred the handling of the biologic suture materials. Donald made a separate diamond-shaped incision for the anterior colporrhaphy with the base of the triangle at the cervix. Fothergill joined the colporrhaphy and trachelectomy incisions, extending the repair posteriorly for improved exposure of the levator myorrhaphy shelf where the uterus sits.

Thomas J. Watkins proposed a novel approach to uterine prolapse and cystocele reduction by using the uterus as a prosthesis. He introduced his interposition operation in 1898, contending that it was ill advised to remove the uterus in any case of prolapse unless it was diseased. Thus, through an anterior colpotomy incision, Watkins brought the uterus forward such that the bladder rests on the posterior wall of uterus, thereby elevating the lower uterine segment and creating antagonistic forces between the prolapsing bladder and uterus. During the same year, Ernst Wertheim (1864-1920) introduced and ultimately popularized radical hysterectomy to the extent that the procedure became known as the Wertheim operation.

The popularity of pessaries flourished throughout the latter half of the century, as practitioners were apparently concerned with uterine malposition (Fig. 1-12). Hugh Lenox Hodge (1796-1873) spoke for many gynecologists of the era when in 1860 he stated:

"The mechanical treatment of uterine displacements by intravaginal supports is essential, a "sine qua non," for their perfect relief; that by pessaries, of suitable material,

size and form, the uterus may very generally be replaced and be maintained in situ; that the local symptoms of weight, pain, etc., the leucorrhea, the menorrhagia, the dysmenorrhea, and all the innumerable direct and indirect symptoms of spinal and cerebral irritation, including neuralgia, nervous headache, nervous affections of the larynx, lungs, heart, stomach, bowels, etc., as also spasms, cramps, and convulsions, may often thus be dissipated; that the intellectual and spiritual being may be elevated from the lowest states of depression, bordering on melancholy, or delivered from the highest degree of maniacal excitement. Patients often are amazed at their own altered sensations; they can hardly realize their identity – feeling as if they were either renovated, or that they had been transported to a “new world.”

Among the most important diagnostic and operative innovations of the century occurred in 1877 when Maximilian Nitze (1848-1906) introduced an electrically illuminated cystoscope. This made possible great improvements in surgery including excision of bladder tumors *in situ*, which Nitze details in his important monograph on cystoscopy in 1889. Shortly afterwards, in 1893, Howard Atwood Kelly (1858-1943; Fig. 1-13) introduced his air cystoscope and published a bulletin on aeroscopic examination of the female bladder and the catheterization of the ureters under direct inspection (Figs. 1-14 and 1-15). His innovation occurred in part by accident while using a water cystoscope in the knee-chest position. The instrument apparently fell to the floor, breaking the glass diaphragm. Kelly reintroduced the cystoscope into the bladder without its glass diaphragm and the bladder immediately distended with air, permitting visualization of its interior and ureteric orifices. Kelly's two-volume *Operative Gynecology* (Appleton and Co., 1898), *Medical Gynecology* (Appleton and Co., 1908),

and *Diseases of the Kidneys, Ureters, and Bladder* (with Burnam, 1914), the latter distinguished by the great illustrations by the German artist Max Brödel (1870-1941), defined the specialty and laid the foundation for progress well into the next century. Through a thorough study of anatomy, gynecology, and surgery, Brödel revolutionized the appearance of medical literature and went on to become head of the first “Department of Art as Applied to Medicine” in the world at Johns Hopkins University in 1911.

William Osler (1849-1919), addressing the Johns Hopkins Historical Club in January 1901, reflected on the accomplishments of medicine in the nineteenth century stating, “In the fullness of time, long expected, long delayed, at last Science emptied upon him from the horn of Amalthea blessings which cannot be enumerated, blessings which have made the century forever memorable; and which have followed each other with a rapidity so bewildering that we know not what to expect next...Measure as we may the progress of the world – materially, in the advantages of steam, electricity, and other mechanical appliances; sociologically, in the great improvements in the conditions of life; intellectually, in the diffusion of education; morally, in a possibly higher standard of ethics—there is no measure which can compare with the decrease in physical suffering in man, woman, and child when stricken by disease or accident....This is the Promethean gift of the century to man” – Speert.

THE TWENTIETH CENTURY: A SPECIALTY EVOLVES

The rapid evolution of technology and procedures related to gynecology and female urology continued into the twentieth century. In 1900, David Gillman introduced round ligament ventrosuspension of the uterus for treatment of uterine prolapse whereby

he carried the proximal round ligament through the peritoneum just lateral to the rectus muscle and sutured it to the posterior rectus sheath. Shortly thereafter, John Montgomery Baldy (1860-1934) and John Clarence Webster (1863-1950) independently devised a virtually identical operation for uterine retrodisplacement. The Baldy-Webster uterine ventrosuspension involved plication of redundant uterosacral ligaments to the posterior aspect of the uterus at a point just above the uterosacral ligaments. Hermann Johannes Pfannenstiel (1862-1909) proposed his low transverse incision to help reduce postoperative hernias. Frederick Eugene Basil Foley (1891-1966) introduced a new plastic operation for stricture at the uretero-pelvic junction for treatment of hydronephrosis. The pathogenesis of rectal prolapse as a form of sliding hernia was put forth by Alexis Moschowitz (1865-1933) in 1912. He devised an operation whereby silk sutures were passed circumferentially about the cul-de-sac of Douglas. Subsequently, gynecologists appropriated the operation to prevent enterocele at the time of hysterectomy.

Throughout the twentieth century, the evolution of urinary incontinence procedures took place. In 1913 Kelly first described his anterior plication stitch – a horizontal mattress stitch placed at the urethro-vesical junction and thereby effectively plicating the pubo-cervical fascia. The “Kelly plication stitch” as shown in Fig. 1-16 resulted in narrowing of a patulous urethra and some elevation of the urethrovesical junction and was the essential component of anterior colporrhaphy for stress urinary incontinence.

Although the Kelly plication was somewhat effective and popular, stress incontinence frequently recurred. Various muscular and fascial sling operations were

thus devised to treat this distressing and persistent problem. The slings utilized adjacent anatomic structures with the purpose of providing proper support for the urethra and of developing a substitute muscular sphincter-like action to replace the one that had been lost through birth injury. Muscle transposition procedures to create a sling under the urethra using rectus muscle, pyramidalis muscle and levator ani were used in the early twentieth century. In 1917, Stoeckel, building on previous work by Goebell and Frangenheim, was the first to combine sphincter plication and the use of a fascial sling with complete success. In 1942, A.H. Aldridge described a technique of making a transverse suprapubic incision and developing bilateral strips of fascia attached at the midline. Aldridge famously noted, “in such circumstances or when the sphincter muscles have undergone too much destruction, complete restoration of function by the usual vaginal procedures can hardly be expected.” The fascial strips were brought down through the rectus muscle, behind the symphysis and united as a sling beneath the urethra. Aldridge was one of the first to emphasize that much of stress incontinence might be due to disruption from birth trauma. The Aldridge rectus fascia sling became the model for similar fascial sling procedures used for recurrent stress incontinence and sphincter deficiency for the next fifty years.

A New York urologist, Victor F. Marshall (1913-2001) began to develop an operation for urinary incontinence in men during the mid-1940s. He employed a suprapubic approach to suspend the bladder and bladder neck by placement of interrupted chromic catgut sutures to the periostium of the symphysis and posterior rectus sheath. Thereafter, he collaborated with two gynecologists, Andrew Anthony Marchetti (1901-1970) and Kermit Edward Krantz (1923-2007), refining and modifying the procedure to

treat incontinence in women. During the half century after its introduction, the Marshall-Marchetti-Krantz (MMK) procedure remained a standard approach to female incontinence. Necessity being the mother of invention gave rise to a modification of the MMK operation when John Christopher Burch (1900-1970) was unable to secure sutures into the retropubic periosteum and ultimately found the support he required in Cooper's ligaments. His 1961 publication on the procedure remains one of the simplest, most widely accepted, and most studied methods of elevating the urethrovesical junction in cases of stress urinary incontinence (Fig. 1-17).

In 1934, Nobel Sproat Heaney (1880-1955) reported on 565 vaginal hysterectomies performed for benign disease. Henceforth, he became one of the most influential proponents of the procedure, praising its lower morbidity and mortality compared to an abdominal approach. While developing the technique, he designed a needle holder, retractor and pedicle clamp to facilitate the procedure and incorporated peritoneum, vessels and ligaments in a maneuver known as the "Heaney Stitch."

The development of an enterocele subsequent to vaginal hysterectomy was addressed in 1957 by Milton Lawrence McCall's (1911-1963) posterior culdeplasty. The operation was performed from below by obliteration of redundant posterior culdesac by a series of continuous sutures along the length of the uterosacral ligaments.

Operative laparoscopy was first employed in gynecologic procedures by Raoul Palmer (1905-1985) in 1943. At a time when laparoscopy was largely the domain of surgeons, he established its role for evaluating infertility and visualizing pelvic organs by placing the patient in the Trendelenburg position and elevating the uterus by means of a trans-cervical manipulator. However, credit for devising the earliest endoscope must go

to Philipp Bozzini (1773-1809), who described his “lichtleiter” in 1806. He advocated the inspection of all “interior cavities ... by looking through natural openings or at least small wounds.” Expounding on the utility of his device, Bozzini wrote, “To give an idea how distinctly the light transmitter reflects the rays, I would like to cite just one example: if, observing proper cleanliness, one places a piece of writing in the fundus of the uterus of a woman who died during delivery, it can be read through the vagina with the help of the light transmitter containing an ordinary wax candle as clearly as by light of a candle standing at the same distance on a table.” Furthermore, he correctly predicted the development of operative endoscopy writing, “Surgery will not only develop new and previously impossible procedures, but all uncertain operations which rely on luck and approximation will become safe under the influence of direct vision, since the surgeon’s hand will now be guided by his eyes.” Amazingly, Bozzini was formally reprimanded for his “undue curiosity” after visualizing the interior of the urethra of a living patient, a reaction that repeats itself on many occasions throughout history as innovations or new ideas are initially put forth.

In 1914, Wilhelm Latzko (1863-1945) introduced a partial-colpocleisis technique for vesico-vaginal fistula closure following hysterectomy. By dissecting off the vaginal mucosa surrounding the fistula and inverting the denuded area with multiple layers, he effectively obliterated the fistulous opening.

From the turn of the nineteenth century and well into the twentieth century, the faculty from the departments of Obstetrics and Gynecology at Johns Hopkins Hospital would become a guiding force for the specialty. Among these leaders is Howard Atwood Kelly (1858-1943), often regarded as the father of American gynecology due to his

important role in establishing gynecology as a surgical specialty in America (see Fig. 1-13). For three decades, he was chairman of gynecology at the Johns Hopkins Hospital where he established the first residency program in gynecology, an innovation in surgical training and an important contribution to the development of the specialty. He was by all measures a prolific author. By 1919, he had published 485 titles, of books, journal articles and pamphlets. In 1899, Kelly consented to the department's division and delegated responsibility for obstetrics to John Whitridge Williams (1866-1931). Williams along with Kelly introduced a new standard of scholarship into America's obstetric and gynecologic literature and teaching. For three decades, Williams exercised a near monopoly in filling the chairs of Obstetrics and Gynecology at the country's major universities. His widely popular textbook, *Williams Gynecology*, continues to bear his name under new editorship. Later, Richard Wesley TeLinde (1894-1989) was appointed chairman in 1939, a post he held for twenty-one years. During his tenure, he played a role in the development of fascial slings for stress incontinence in the United States and performed much of the preliminary work in delineating the diagnosis of and appropriate treatment for cervical carcinoma-in-situ. Perhaps TeLinde is best known for his text *Operative Gynecology* which was published in 1946 and which was destined to be and remains the standard American work on the subject under successive authors.

Thus, we owe a great debt of gratitude to these and many others who established the foundation for successful pelvic surgery and ultimately for our specialty. Perhaps Kelly, himself an avid historian and bibliophile, summarized it best stating, "No group should ever neglect to honor the forebears upon whom their contributions are based. Great is the loss to anyone who neglects to study the lives of those he follows."

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Table 1-1: TIMELINE OF MILESTONES RELATED TO PELVIC SURGERY AND FEMALE UROLOGY

- Second half first century Common Era Soranus - *De Morbis Mulierum* – first good description of the human uterus.
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- 1672 First accurate account of the female reproductive organs and ovarian follicles (“Graafian Follicles”) – *De Mulierum Organis* by Reinier de Graaf.
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- 1774 William Hunter completes his monumental work – *Anatomy of the Gravid Uterus*, which remains the finest work on uterine anatomy to date.
- 1801 Joseph Claude Recamier popularizes the use of a tubular vaginal speculum to treat ulcers and infections of the vagina and cervix.
- 1803 Pieter Camper describes the superficial layer of abdominal fascia.
- 1804 Astley Paston Cooper describes the ligamentous covering of the pubis and its condensation above the linea ileo-pectinea as it extends from the pubis outwards.
- 1805 Philipp Bozzini introduces his lichtleiter (light conductor), the earliest endoscope.
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- 1900 David Tod Gilliam describes his method of uterine ventrosuspension whereby he ligated the proximal round ligament and attached it to the anterior rectus sheath lateral to the rectus muscle.
- 1900 Johannes Pfannenstiel introduces a transverse incision for laparotomy.
- 1901 Alfred Ernest Maylard advocated oblique transection of the rectus muscles to improve exposure.
- 1901 John Clarence Webster and John Baldy introduce their suspension technique for correction of uterine retroversion whereby the proximal round ligament is brought under an opening made under the utero-ovarian ligament and ultimately secured a just above the utero-sacral ligament.
- 1909 George Reves White notes that certain cases of cystocele are due to lateral, paravaginal defects and thus can be repaired by reconnecting the vagina to the “white line” of the pelvic fascia.
- 1910 Max Montgomery Madlener introduces a popular female sterilization technique employing ligation of the tube alone.
- 1911 Max Brödel becomes head of the world’s first Department of Medical Illustration at Johns Hopkins University.
- 1912 Alexis Victor Moschowitz describes the passage of silk sutures around the cul de sac of Douglas to prevent prolapse of the rectum.
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- 1957 Milton L. McCall describes his posterior culdeplasty to prevent or treat enterocele formation at vaginal hysterectomy.
- 1961 John Christopher Burch introduces his method of urethrovaginal fixation for treatment of stress urinary incontinence.

FIGURE LEGENDS

- Fig. 1-1 Introduction / cover: 16th C. woodcut showing examination of women with uterine prolapse, from Stromayr's *Practica Copiosa*, 1559.
- Fig. 1-2 16th C. woodcut depicting placement of a pessary to treat uterine prolapse, From Stromayr.
- Fig. 1-3 16th C. woodcut by Stromayr showing a pessary fashioned from a sponge, bound by twine, covered in wax and dipped in butter prior to placement.
- Fig. 1-4 17th C. woodcut illustrating incision and drainage of a hematocolpos, from Schultetus's *Armamentarium Chirurgicum*, 1656.
- Fig. 1-5 18th C. vaginal speculum used to differentiate the various "vaginal hernias" – Garengéot.
- Fig. 1-6. James Marion Sims (1813-1883), from *Clinical Notes on Uterine Surgery*, London: 1866
- Fig. 1-7 Four-valve vaginal speculum with detachable blades by Charriere circa 1850. Private collection
- Fig. 1-8 Sims' knee-chest position, from Bourgery.
- Fig. 1-9 Series of watercolor lithographs depicting Sims' operation for vesicovaginal fistula, from Bourgery.
a) Trimming the edge of vesicovaginal fistula; note silver catheter in place
b) Placement of silver sutures
c) Completed closure of fistula
- Fig. 1-10 Alwin Karl Mackenrodt (1859-1925), from Basckett.
- Fig. 1-11 An illustration of the cardinal ligaments in a fetus of eight months, from Mackenrodt's Ueber die Ursachen dernationalen und pathologischen Lagen des Uterus. *Arch F Gyna.*, 48:394-421, 1895.
- Fig. 1-12 Various 19th C. Pessaries, from Bourgery.
- Fig. 1-13 Howard Atwood Kelly (1858-1943).
- Fig. 1-14 Various positions air cystoscope may take to illuminate all parts of the bladder. From Kelly and Burnam: *Diseases of the Kidneys, Ureters, and Bladder*, vol. 1, 1914. p. 262. Fig. 135.

Fig. 1-15 Beginning catheterization of the left ureter in knee-chest posture through an open-air cystoscope. From Kelly and Burnam: Diseases of the Kidneys, Ureters, and Bladder, vol. 1, 1914. p. 269. Fig. 141.

Fig. 1-16 The Kelly plication stitch for stress urinary incontinence (from Kelly HA: Incontinence of urine in women. Urol Cutan Rev 17:291, 1913).

Fig. 1-17 Burch urethrovaginal Fixation Procedure.

- a) The suture has been passed through the perivaginal fascia and the wall of the vagina, but not through the mucous membrane. The sutured point is now matched to that point on Cooper's ligament to which it is most easily approximated, and the suture passed through this point and tied.
- b) The lateral edges of the vagina have been approximated to Cooper's ligament by three interrupted sutures.

From: Burch JC. Urethrovaginal fixation to Cooper's ligament for correction of stress incontinence, cystocele, and prolapse. Am J Obstet Gynecol 81:281, 1961.

Table 1-1: Timeline Of Milestones Related To Pelvic Surgery And Female Urology

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