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Donald K. Wood, MD, is a surgical oncologist at the University of Illinois Medical Center in Chicago. He is a Fellow of the American College of Surgeons and has worked in academic surgery for more than 30 years. Surgical education, basic and clinical research and patient care are at the core of his work. Dr. Wood graduated from the Abraham Lincoln School of Medicine (later renamed University of Illinois College of Medicine at Chicago) in June 1967, shortly after Dr. Nyhus’s arrival. He was in the first class to begin their residency in general surgery at the University of Illinois under Dr. Nyhus. Dr. Wood was chief resident in surgery at Illinois and then did a chief residency in trauma and peripheral vascular surgery at Cook County Hospital before returning to the University of Illinois as an attending physician in surgical oncology under Dr. Das Gupta. He served as an attending surgeon in surgical oncology at Cook County, Illinois and West Side Veterans Administration Hospital, where he also was chief of surgical services from 1992 to 2005. Dr. Wood is historian and past president of the Warren H. Cole Society.

He says, “To train and mentor the next generation of surgeons is exciting and challenging enough, but to work with the team of skilled and motivated professionals affiliated with University of Illinois surgery made this era even more rewarding for me personally. As our chief, Dr. Nyhus set the bar high, and those touched by his influence felt driven to succeed.”

This book began as a chronology of Nyhus as a surgeon and leader. It evolved into a journey behind the scenes at the University of Illinois at Chicago, tracing how the Department of Surgery in the 20th century grew over several generations through academic relationships, clinical accomplishments, innovation and vision.
LLOYD M. NYHUS, MD, FACS
SURGEON, MENTOR, VISIONARY FOR 20TH CENTURY SURGERY

MICHELLE G. RAPAPORT
WITH DONALD K. WOOD, MD, FACS
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Every surgeon trained in an academic setting can say that they had many teachers and mentors, but they have only one Chief. Dr. Lloyd Nyhus was my Chief and that will remain so for the rest of my life. He was to me and to so many others a teacher, mentor, expert technician, firm but compassionate guide and friend.

It is said that a true professional demonstrates four distinctive characteristics: competence, compassion, communication, and character. In my interactions with Dr. Nyhus—first as a resident and then as a faculty surgeon—he exemplified these characteristics every day.

Donal K. Wood, MD, FACS, University of Illinois
Faculty surgeon 1967–2009

Foreword

In many ways, Lloyd Milton Nyhus was the epitome of a chairman of surgery at an academic medical center during the last third of the 20th century. In essence, Nyhus was a world-class surgeon running a world-class residency and research program at a world-class university. He led the Department of Surgery at the University of Illinois College of Medicine at Chicago for 22 years, from 1967 to 1989. His active involvement continued for another 15 years as emeritus department head and as a respected leader within the worldwide realm of surgery.
Nyhus’s influence was far-reaching. As a clinician, he brought innovative solutions to patients with hernia, ulcer and other maladies of the gastrointestinal tract. As a teacher and mentor, Nyhus sharpened the clinical skills and shaped the careers of more than 300 young surgeons. As an academic department chair, Nyhus had foresight that steered a realignment of surgical specialties that fits well with today’s surgical environment. As an international emissary, Nyhus forged bonds between leading surgeons around the world. Four decades after the publication of his first book with his mentor and co-author Henry Harkins, Nyhus’s words continue to guide future generations of surgeons. Indeed, his impact on the field of surgery is indelible.

Within these pages, we peer back at the life of Lloyd M. Nyhus: the man, the surgeon, the leader and the international diplomat. By examining the past, we can appreciate his influence and the collective influence on all he trained and on the future of surgery.

Nyhus’s influence on surgery and surgical education must be viewed within the historical context of his era: roughly post-World War II until the late 20th century. This period was characterized by fundamental changes in surgical technique, technological advances, and medical education throughout the United States and around the world. It was an era that saw profound advances in anesthesia and antibiotics, the advent of mechanical ventilators and intravenous feeding, the birth of blood banking, development of synthetic suture and graft materials, increasing specialization among surgeons, and the globalization of medicine. Today these aspects of surgery are perceived as routine and non-extraordinary. But within the context of Nyhus’s time period, they were revolutionary steps that changed the face of surgery.

Nyhus was instrumental in initiating, applying, or embedding these advances in both the practice and the teaching of surgery. At the core of all he saw the primacy of general surgery—that elemental and necessary experience of operating by fundamental principles that give confidence, creativity and integrity to any procedure.

As a surgeon, teacher and international ambassador, Nyhus had an influence that endures among surgeons. Anyone who has undergone the rigors of medical training can identify with the man described on these pages. In looking back, many a physician can see part of his or her own journey in the life of Lloyd Nyhus: a man whose career spanned a generation of medicine that witnessed the transformation from the trusted doctor rooted in the community—personally known and considered a trustworthy source—into a medical world characterized by lack of personalization and dominated by Medicare, managed care, specialization and the threat of malpractice suits.

The story on these pages is pieced together from a patchwork of sources: personal recollections from Nyhus, Donald Wood and other University of Illinois surgeons; personal letters sent to and from Nyhus over the decades; papers saved by Nyhus in hundreds of manila folders; and other published sources. While its delivery is imperfect, Nyhus’s story is told because it envelopes a bygone era, captures an exciting and invigorating time in American surgery, and encompasses the life of an academic department of surgery whose vibrancy endures to this day.
Leader in Surgery: Visionary & Thought Leader

While Lloyd Nyhus was lauded in Chicago as an inspiring teacher and astute department head, it was within national and international circles that he earned broader recognition as a leader among surgeons. He was viewed as an insightful surgeon with expertise in hernia and ulcer, an industrious writer of medical texts, an engaging speaker at surgical forums, and an amiable leader within surgical associations and on editorial boards.

Healer, teacher, innovator, leader, visionary. Each of these terms describes Lloyd M. Nyhus at some point during his half-century career.

He was a healer to the hundreds of patients who turned to him for relief from hernia, ulcer or other maladies. He was a teacher to more than 300 residents who came under his tutelage in Seattle and Chicago. In a broader sense, he was a teacher to surgeons worldwide who read his textbooks and articles or listened to his many presentations. In this broader context, he imparted
knowledge to several generations of surgeons whose own expertise represented varied disciplines and whose own patients circled the globe.

And to surgeons near and far, Nyhus was seen as innovator, leader and visionary. It was with these personas that Nyhus earned honors from surgical associations around the world.

These four personas were interrelated. As a skilled surgeon, Nyhus channeled his knowledge of hernia, ulcer and abdominal anatomy into medical writings: textbooks, research papers, book chapters and opinion pieces. His textbooks, in particular, provided teachings for countless surgeons worldwide. With his name appearing so often in surgical publications, Nyhus received frequent invitations to speak at surgical conferences throughout the United States and the world. As a teacher, he directly influenced young surgeons at the Washington and Illinois universities, and inspired many of them to pursue careers in academic medicine. As head of what became one of the leading surgical programs in the United States, Nyhus earned respect and built friendships among many colleagues in Chicago and across the globe.

All of these characteristics pushed Nyhus to the fore in the leadership of important surgical societies such as the American Board of Surgery (chairman), American College of Surgeons (first vice president), American Surgical Association (first vice president), Collegium Internationale Chirurgiae Digestivae (president), Society of University Surgeons (president), and other organizations.

Despite his esteem in the surgical world, Nyhus also was considered a humble and congenial man who encouraged others to excel and succeed. As his star began to rise and then soar, Nyhus often worked as part of a team. Whether leading the team, following the lead of another, or equal partners with colleagues, Nyhus’s ascent was rarely solo. In fact, many surgeons associated with Nyhus—at the University of Washington, University of Illinois and around the world—also gained prominence during this time. Some were noticed initially because of their association with Nyhus, while others rose on their own accord, parallel to Nyhus peer-to-peer.

By choice and by intent, Nyhus surrounded himself with “winners.” Those who learned from him often were inspired to reach great potential. Those who worked or wrote with him were encouraged to pursue opportunities and reach higher standards.

Performing solo, in partnership, or as part of a team, Nyhus earned recognition as a leader in the broad world of surgery. His writings, his progress in the operating room and laboratory, his management of a prominent academic department of surgery, his service on editorial boards and in major surgical associations, and his relationships with surgeons throughout the United States and abroad thrust Nyhus into the limelight among surgeons worldwide.

**General Surgery as the Core of Specialization**

Nyhus played a crucial role during a pivotal period of change within the global field of surgery, as the discipline was becoming increasingly specialized and subspecialized. Throughout this transition, Nyhus held firm to his view of general surgery as “the core of all surgery—the necessary foundation to all surgery.” In Nyhus’s perspective, knowledge of and expertise in general sur-
surgery were essential steps to prepare the surgeon to perform the more specialized techniques used in vascular surgery, urology, orthopedics and other surgical subspecialties.

Nyhus's dedication to general surgery, however, did not blind him to the importance and inevitability of increasing specialization. In fact, he opened doors to specialization. Most surgeons in Nyhus's past had been generalists. He recognized that many surgeons in his future would be specialists. As head of a prominent academic department of surgery and in leadership positions at surgical societies including the American Board of Surgery, American College of Surgeons and the International Society of Surgery, Nyhus helped shepherd this transformation of general surgery into multidisciplinary subspecialties.

He was a trailblazer with his own surgical department within the University of Illinois at Chicago. Nyhus was among the first U.S. department heads to reorganize an academic department of surgery into multiple specialty divisions. In Chicago, he oversaw creation of the Division of Surgical Oncology in 1969 under Tapas K. Das Gupta, MD, PhD; the Division of Peripheral Vascular Surgery in 1978 under D. Preston Flanigan, MD; and a fellowship program in critical care at affiliate Cook County Hospital, under Olga Jonasson, MD, Samuel Appavu, MD, John Barrett, MD, and Takayoshi Matsuda, MD. The University of Illinois Department of Surgery was among the nation's first to create divisions for transplantation, head and neck surgery, colon and rectal surgery, and other specialized areas of surgery.

In spite of these moves and the growing splintering into surgical subspecialties, Nyhus held tightly to his conviction that general surgery must remain the core of all surgical specialization; and he instilled this conviction in those who trained under his leadership at Illinois. Nyhus believed firmly that experience in general surgery should endure as an essential element of surgical training programs because it prepares surgeons to excel in more specialized aspects of surgery. His view of general surgery as the underpinning of all surgery is one of his legacies and visions for physicians of the 21st century.

Speaking as president of the Central Surgical Association in 1985, Nyhus expressed his concerns regarding what he called "the dissection of the body of general surgery" and the need for comprehensive training. He said:

_There have been sufficient incursions upon this discipline [general surgery] to cause questions to be raised about its viability. When we review the definition of general surgery as published by the American Board of Surgery, doubts must arise. ... General surgeons are expected to have a detailed knowledge of the alimentary tract, abdomen, breast, head and neck, peripheral vascular system and endocrine system, and of the surgical management of trauma, including musculoskeletal and head injuries. Preoperative, operative and post-operative care of the injured patient, including that provided in the emergency department and ICU, is the responsibility of the general surgeon. Does every approved program include all these fundamental parts of an adequate base for training in general surgery? Having visited many programs throughout the United States, I can assure those interested that the answer is no._

_Lloyd Nyhus address, 1985_

Nyhus's comments included practical recommendations for super-specialization of the general surgeon into one of four key...
areas: surgical endoscopy, surgical critical care, peripheral vascular surgery and surgical oncology.

At Illinois, the results from separate divisions under a single surgical umbrella were encouraging. Previously, peripheral vascular had been bundled with other specialties and had not thrived. Now, Nyhus said, “the isolation of peripheral vascular surgery in a specialty unit has been a successful experiment in our institution.” Similarly, introduction of a distinct division at Illinois pushed surgical oncology into greater prominence, particularly in research realms.

Nyhus cited the surgical oncology division at the University of Illinois as “a perfect example of what can be achieved to correct the inequities in research application and funding.” He noted that, nationally, a sample round of grant applications to the National Cancer Institute showed surgeons accounted for only 7 percent of total requests. The remainder of cancer research was being done from the perspectives of medicine, pediatrics and radiation oncology.

Nyhus noted, “Whereas sections of medical oncology are rampant within departments of medicine [nationwide], few divisions of surgical oncology have [yet] been formed. … The foregoing is a plea for the development of similar units in surgical departments in universities throughout this country … They are concerns shared by academicians and surgical practitioners alike.”

Propelled by Nyhus’s passion and leadership, Das Gupta built the University of Illinois Division of Surgical Oncology into an outstanding center for translational research, training and surgical treatment of patients with cancer—bridging discoveries in basic science with practical application in patient care. Over the years, Dr. Das Gupta obtained more than $30 million in R01 grants from the National Institutes of Health for research in issues related to surgical oncology. Research training grant funding from the Society of Surgical Oncology over a 20-year period supported training for many surgeons at the University of Illinois in basic and clinical research with inculcation of surgical oncology principles applied to visceral and soft tissue tumors. Due to Das Gupta’s success in translational research for surgical oncology, the University of Illinois Board of Trustees granted “departmental” status to the division of surgical oncology in 1992—making the Department of Surgical Oncology at the University of Illinois one of the first academic departments dedicated to surgical oncology in the United States.

Surgical Innovator
As an innovator, Nyhus fine-tuned surgical methods to improve clinical results. His achievements in hernia and ulcer surgery are well-known to most practitioners in these fields. His refinement of the vagotomy technique made significant strides in the success of ulcer surgery. As his mentor Henry Harkins described, Nyhus’s animal research first demonstrated the advantages of pyloroplasty over gastroenterostomy when used as a drainage technique associated with vagotomy. Later, Nyhus applied the principle of pyloroplasty for drainage in humans undergoing clinical vagotomy. His success launched worldwide acceptance of this important refinement to vagotomy surgery.

True to his focus on fundamentals, Nyhus in the early 1960s also devised guidelines for conservative medical treatment of ulcers. He recalled:
In the field of gastric surgery, I noticed a similar lack of precision in terms of blood replacement and the timing of operations for the patient with massively bleeding ulcers, either gastric or duodenal. For this reason in the early 1960s, I developed a series of guidelines for conservative medical treatment at the outset and specific indications for when a patient needed an urgent operation. These guidelines to surgical intervention in massive hemorrhage from gastric or duodenal ulcers have been a great help to me and my colleagues.

*Surgical Treatment of Digestive Disease, 1988*

In the arena of hernia surgery, Nyhus made important contributions through research and clinical advancements. His research and innovation improved the viability of the preperitoneal approach for repair of groin hernias. He and his team were among the first to use prosthetic mesh to buttress hernia repairs. His classification nomenclature gave surgeons worldwide detailed and uniform terminology for discussion of specific types of hernia.

This work remains relevant even in today's environment—in which laparoscopic repair has replaced traditional open surgery for most hernia repairs. Modern surgeons still turn to earlier works of Nyhus, Robert E. Condon, René Stoppa, Irving Lichtenstein and others as a foundation for successful tension-free hernia repair with prosthetic mesh. The Harkins/Nyhus textbook on hernia—updated through the years—remains an important resource in surgical libraries.

Lesser known, perhaps, are some of Nyhus's other clinical accomplishments. He was among the first to promote use of ultrasound technology during pancreatic and biliary surgery.

Writing in 1981—at a time when ultrasound technology was being newly applied in the field of surgery—Nyhus said:

> Our initial experience indicates that operative ultrasonography compares favorably with operative cholangiography. ... Operative ultrasonography is a relatively simple procedure which has the potential for providing the surgeon with early information and decreasing the need for dissection and radiographic imaging.

_American Journal of Surgery, January 1981_

Additionally, Nyhus, Ronald Nichols, MD, and the University of Illinois Department of Surgery are credited with advances in preoperative bowel preparation. Nyhus and Illinois colleagues William Schumer, MD, and Gerald Moss, MD, made important advances in the use of corticosteroids for the treatment of shock.

Much of Nyhus's research and writings focused not only on technique, but also addressed the fundamentals of human anatomy. Nyhus recognized that thorough knowledge of anatomic intricacies is essential for successful surgery. For example, his descriptions of the physiology of esophageal reflux paved the way for more effective surgical intervention.

*From Dr. Nyhus's viewpoint, the technical aspect of surgery is only the visible part of the iceberg. The real weight of the surgeon's skill derives from his study of basic physiology.*

*Medical News, April 17, 1967.*

Nyhus's clinical investigations included continuous studies into the fundamentals of anatomy and biology. As such, many of his published materials can be found in physiology journals and textbooks, rather than exclusively in surgery-focused journals.
He strongly urged young surgeons to augment their surgical training with studies of the basic sciences, including immunology, physiology and cell biology.

**Focusing Interests on the Abdomen and Groin**

Nyhus’s 50-year ascent in the larger realm of surgery began in the earliest days of his career. The Guggenheim Fellowship in Scotland and Sweden at the end of his residency played a key role by exposing the young Nyhus to diverse surgical perspectives and styles. The Guggenheim experience introduced Nyhus to the international world of surgeons, and introduced the international world to Lloyd Nyhus.

When he returned to the University of Washington, Nyhus was primed for his emerging role as one of Henry Harkins’s preeminent students and, later, as an academic surgeon destined for a place in surgical history.

Of course, in the mid-1950s the young Nyhus could not foresee where his career would lead him. He concentrated on the work at hand: primarily ulcer, hernia, and the anatomy of the abdomen and groin.

Nyhus worked hard as a junior member in Washington’s vibrant surgery department. Under the leadership of chairman Harkins, the department of surgery in Seattle became well-known for its innovations in GI surgery, particularly in the areas of ulcer and hernia. Nyhus wisely focused his surgical activities on these areas, building upon the foundation already in place at Washington. This focus would serve as the mainstay of his medical writings, teachings and presentations, and for many of his leadership roles related to surgical associations and journals.

**Leader in Hernia Technique and Thought**

Ulcer occupied much of Nyhus’s early work, yet hernia eventually became the predominant focus of Nyhus’s surgical activities, research, and subsequent writings and presentations. The medical journals are bursting with hernia-related papers authored by Nyhus and cohorts. Similarly, many articles written by other surgeons include Nyhus papers in their list of reference citations.

Long after he retired in 1993 from active clinical, research or teaching activities, Nyhus continued to be regarded as a leader in surgery—most notably in the field of hernia and to a lesser degree in ulcer and general surgery. He continued to write for the medical literature and presented periodically to surgical audiences. From 1993 through 2005, Nyhus published more than 50 papers and commentaries in U.S. and foreign journals, and more than 25 book chapters.

He continued to lecture and receive honors after his retirement, too. His presentations were heard at surgical conferences in Europe, South America and North America. He received honors from surgical societies in Bulgaria, Scotland, Argentina, Colombia, Costa Rica, Spain and elsewhere, extending the already long list of honors he had earned from around the world.

In 2005, the University of Illinois Department of Surgery honored its former leader by establishing the Lloyd M. Nyhus Chair in Surgery—an endowment established to promote surgical excellence, leadership and research for generations to come.
The progress of the Seattle group followed work done by predecessors. A decade before Nyhus began ulcer investigations with Harkins, Lester Dragstedt, MD, and Frederick Owens Jr., MD, reintroduced truncal vagotomy at the University of Chicago. Effective in concept and a notable improvement in practice compared with other techniques, truncal vagotomy nonetheless still allowed the production of some acid and, therefore, resulted in unsatisfactory rates of ulcer recurrence and other gastric complications.

Others also attempted to improve on the vagotomy procedure. Selective gastric vagotomy combined with total anterior vagotomy was described in 1947 by R.G. Jackson, MD, and again in 1948 by Francis D. Moore, MD. Also in 1948, C. Franksson, MD, performed selective anterior and posterior vagotomy combined with preservation of the pyloric ramus. None of these early advances employed a drainage technique; thus, they met limited success. Hence, the procedure was abandoned—at least until the work of Harkins, Nyhus and their partner investigators in Seattle.

In 1955, the Washington team began investigating selective gastric vagotomy in lab animals. For the first time, these investigators combined vagotomy with antrectomy to address peptic ulcer disease. Almost intuitively, Nyhus recognized that combining vagotomy with antrectomy provided a more “physiologic” reconstruction of the stomach and duodenum than other available options, and resulted in lower incidence of severe or long-term complications. The combined vagotomy-antrectomy was ardently promoted by Nyhus and others, and was considered the gold-standard operation for ulcer during much of the latter 20th century.

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Nyhus’s close relationship with Henry Harkins laid the foundation for his clinical pursuits, research, writings and leadership. It all began with ulcer. For 15 years during the 1950s and into the ’60s, the Seattle ulcer group at the University of Washington conducted many studies on surgical treatment of ulcer. The Seattle group became well-known for its findings. Initially led by Harkins, the Seattle group over time found itself increasingly led by the partnership of Harkins and Nyhus.

Working alongside Harkins in Seattle, Nyhus gained early recognition for his role in refining the “combined” vagotomy surgical procedure to address peptic ulcer disease. Almost intuitively, Nyhus recognized that combining vagotomy with antrectomy provided a more “physiologic” reconstruction of the stomach and duodenum than other available options, and resulted in lower incidence of severe or long-term complications. The combined vagotomy-antrectomy was ardently promoted by Nyhus and others, and was considered the gold-standard operation for ulcer during much of the latter 20th century.

Leader in Surgery: Ulcer

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as opposed to the classical truncal vagotomy.” It was a step in the right direction.

The combined technique became known as “highly selective vagotomy” and proved much more effective at fully blocking acid production than earlier surgical techniques. With highly selective vagotomy, the incidence of ulcer recurrence diminished significantly.

Nyhus’s later work and writings focused on the challenges of hernia, yet he did not abandon his efforts to refine ulcer operations. In 1977, Nyhus and other surgeons at the University of Illinois published findings from an extensive study of ulcer patients at Chicago’s West Side VA Hospital. They found the best results from combined vagotomy and antrectomy; this operation, in turn, was performed increasingly throughout the 1970s and ‘80s to treat peptic ulcer. The truncal vagotomy-antrectomy combination had an ulcer recurrence rate of 5 percent or less and very low postoperative mortality. Nonetheless, dumping syndromes remained a common complication after this and other ulcer operations.

Continuing Advances in Surgical Treatment of Ulcer

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Ulcer Operations, Viewed in Context of the Times

Nyhus’s extensive focus on surgical treatment of ulcer may seem amiss from today’s perspective, now that anti-ulcer medications have rendered surgical treatment obsolete for all but the most severe ulcers. But during Nyhus’s era, medical treatment was not yet a feasible option for ulcer; thus, surgical intervention was the treatment of choice.

Before medical therapy became available in the mid-1980s, peptic ulcer disease had eluded successful long-term treatment for many generations. Perforated duodenal and gastric ulcers were documented in medical literature as early as 167 B.C. in China, but did not receive surgical treatment until well into the 1900s. In 1843, Edward Crisp reported on 50 cases of perforated peptic ulcer, concluding that “once perforation has occurred, the case must be considered hopeless. In surgery’s present state, the idea of cutting open the abdomen and closing the opening would be too quixotic to mention.”

With the development of anesthetics, surgical treatment became a more viable option. Throughout most of the 20th century, surgical intervention was the principal treatment for gastroduodenal ulcer disease.

That all changed with the discovery of a link between Helicobacter pylori (H. pylori) infection and peptic ulcer in 1982 (first published in 1984). A wave of effective pharmaceutical interventions pushed ulcer operations to the sidelines.

Today, surgical therapy for ulcer is primarily limited to emergencies and complications such as hemorrhage, perforation or obstruction. Nonetheless, the work of Nyhus and his colleagues...
Leader in Surgery: Influence on Hernia Surgery

Lloyd Nyhus’s career as a general surgeon covered much ground: ulcer, anatomy, shock and trauma, the colon, and more. In each of these areas, he contributed with writings, research, insights and teachings.

Yet, it was in the area of hernia surgery that Nyhus made his most profound mark.

Nyhus’s worldwide distinction in surgical technique and intricate knowledge of groin anatomy began with the reintroduction of the preperitoneal approach to hernia repair, several years before publication of the landmark Harkins/Nyhus book Hernia. Although he did not invent the preperitoneal approach, Nyhus is credited with refining this technique and promoting its broad usage. Ultimately, it was Nyhus’s advance of the preperitoneal approach that brought him worldwide recognition in the field of hernia repair. Even today, a surgical trainee’s understanding of hernia repair is incomplete without study and practice of the

Looking Back, Moving Forward

Nyhus always acknowledged the role that his surgical predecessors played in modern surgical advances. Such was the case with his work in ulcer. In an invited textbook commentary on the topic of gastro-duodenal disease, Nyhus acknowledged the vagotomy groundwork of Lester Dragstedt of the University of Chicago, who was a mentor to Nyhus’s own mentor, Henry Harkins. Nyhus wrote:

Because of his move from bench research alone to bench and clinical studies, Dragstedt made a special impact on the care of patients with gastro-duodenal disease …

We recognize today that the gastric stasis hypothesis of Dragstedt is partially flawed. Yet, the Type II gastric ulcer in conjunction with old obstructive duodenal ulcer disease (about 10 percent of all gastric ulcers) truly is a Dragstedt ulcer …

Lloyd Nyhus, invited commentary to Surgical Treatment of Digestive Disease, Part III: Gastro-duodenal Disease, 1988

—first at the University of Washington and later at the University of Illinois—is still regarded as important and relevant for understanding ulcer progression and treatment.
The path to the preperitoneal approach took several turns before gaining broad acceptance. Nyhus recalled:

As a surgical trainee of Professor Henry N. Harkins at the University of Washington in Seattle, I was indoctrinated into the posterior abdominal wall repair for all groin hernias. Dr. Harkins, while a staff surgeon at the Henry Ford Hospital in Detroit, Michigan, became interested in and studied the use of the “Cooper’s” ligament as a key anatomic structure for hernia repair. Indeed, it was Harkins who coined the term “McVay Repair” for this well-known and highly respected procedure. We are reminded that these two surgeon-anatomists [McVay and Harkins] deprecated the use of the inguinal ligament in the repair of direct, femoral, and large indirect hernias. Nyhus, Hernia, 2003

Harkins’s influence on Nyhus was indelible, and his endorsement of preperitoneal hernia repair certainly spurred Nyhus’s pursuit of this approach. Long before Nyhus became a surgeon, Harkins had written:

The approach is only one detail of the operative method. It is simply the aspect from which the inguinal wall is viewed—in the posterior approach one views the posterior inguinal wall directly. Many repair techniques can be performed by the posterior approach, but few surgeons have adopted one proven technique to perform by the posterior approach and have used that technique exclusively. Repairs by the anterior approach [Shouldice repair and Cooper ligament repair] are accepted as state-of-the-art operations because surgeons meticulously follow all the steps of the repair as taught at the Shouldice Clinic or by devotees of the Cooper ligament repair…
We surgeons who choose the posterior approach must learn well one repair and they must continually perform the chosen repair, giving it the same attention to detail they afford operations performed by the anterior approach. When they see that the approach is but one of the details of a repair, surgeons will see their results improve.

Nyhus, recollections of Harkins, appearing in Hernia Surgery, June 1993

When Nyhus was in residency at the University of Washington under Harkins in the early 1950s, the anterior approach was still the status quo for surgical hernia repair. Yet the posterior approach loomed as a possibility for those adventurous enough to consider this alternative. With Harkins as his mentor, Nyhus explored the potential of the posterior approach, which later became known as the “preperitoneal” approach to hernia repair.

Nyhus was a chief resident in 1954 when he and Harkins met with Professor Clarence Berne, whose studies would inspire Nyhus. The three conversed during a meeting of the Society of University Surgeons. Berne—then chairman of the Department of Surgery at the University of Southern California—explained how he and William P. Mikkelsen were completing a study of the Cheate-Henry posterior approach through a vertical lower abdominal incision for femoral hernioplasty (suprapubic extraperitoneal approach). Nyhus recalled, “Dr. Harkins agreed that I should study this approach. However, I believed a more direct method of reaching the preperitoneal space would be lateral to the rectus muscle.”

Nyhus was intrigued by the discussions with Berne. He returned to Washington and pored through the surgical literature to learn more about the posterior approach. His studies revealed that the posterior approach had “a long and somewhat checkered history.” He found, for example, that the iliopubic tract was discussed in 1836 by Alexander Thomson, a British surgeon studying in Paris. French surgeons had recognized the importance of this structure, yet it was overlooked by surgeons in the United States and England. In 1876, Thomas Annandale of Edinburgh, Scotland, first described the posterior approach to the repair of groin hernia.

Decades after Annandale’s work, the importance of the iliopubic tract as it relates to the posterior inguinal wall was redefined by Robert Condon, while working in Nyhus’s lab during the 1950s. “[Condon’s] dissection of the groin in autopsy specimens allowed us to clarify the role of the iliopubic tract as an analogue of the endo-abdominal fascia and its relationship to all groin hernias,” said Nyhus. Many years later, Nyhus noted: “The iliopubic tract repair from the anterior approach was described nicely by Condon. I call this approach the ‘iliopubic tract repair’ or the ‘Condon operation.’” Condon and Nyhus were instrumental in defining anatomic structures in the abdomen and coined the term “iliopubic tract” to describe the extension of the transversalis fascia that extends below the inguinal ligament.

Adding newer anatomic understanding to older surgical techniques proved crucial as Harkins and Nyhus studied the posterior approach further. They focused on a more direct approach to reach the preperitoneal space lateral to the rectus muscle. With improved understanding of anatomic structures—notably the iliopubic tract—and with use of the posterior approach, surgeons could perform the operation in such a way...
that muscles, ligaments and other tissues could move together freely after the surgical repair. This freedom of movement was a substantial improvement over previous approaches, notably, the conventional anterior approach, after which tissue was fixed and pulled under strain, often leading to hernia recurrence. With the posterior approach popularized by Nyhus, there was no fixed point for tissues and no shearing forces to cause a recurrence of the hernial defect after surgical repair. Instead, tissues could move as necessary. Evaluation of the posterior approach in comparison with other methods showed a decrease in hernia recurrence.

Harkins, Nyhus and Condon (a resident at this time) were among the first to seriously evaluate and purport the preperitoneal approach to hernia repair as an alternative to traditional hernia repair by anterior approach and as a proposed antidote to high hernia recurrence rates. In essence, their innovations were a complete reversal of traditional hernia repair. In the Harkins and Nyhus application, the prefix “pre-” in “preperitoneal” connoted “before” the peritoneum to indicate the anatomic plane of dissection. The preperitoneal method approached groin hernia from inside the inguino-abdominal wall.

Nyhus wrote: “The evolution of the posterior approach from that of intraperitoneal visualization of the groin hernia defects to the current careful and precise dissection and repair of the posterior inguinal wall in the preperitoneal space has encompassed a century of trial and error and success [beginning in 1876 with Annandale] …”

Technical considerations certainly influenced the success of applying the posterior approach to recurrent hernia. Looking back in 1989, Nyhus wrote in *World Journal of Surgery*: “It is not surprising that surgeons who are not familiar with the posterior approach should sometimes have difficulty achieving effortless exposure of the proper tissue planes. For this reason, it is imperative that anyone interested in the procedure first watch an experienced operator. … In this operation [posterior preperitoneal approach], there is no substitute for experience in defining the sometimes subtle spaces and layers.”

For successful preperitoneal repair, Nyhus advised: “The iliopubic tract should be lifted in an anterior direction when sutures are placed into it at the level of the femoral artery and vein. Unless this precaution is taken, the vessels may be traumatized.”

He elaborated, “The clear separation of the inguinal ligament from its ‘shelving edge,’ that is, the iliopubic tract of the posterior wall by Condon, was a major step in advancing our understanding of groin anatomy as seen posteriorly.”

**Early Success with the Preperitoneal Approach**

Nyhus—an assistant professor by this time—served as Harkins’s close ally. Together, Harkins and Nyhus led the Washington team’s pursuit of preperitoneal approach, a novel option for hernia repair. A preliminary report of the Washington team’s results with 50 patients appeared in 1959 in the *Western Journal of Surgery, Obstetrics and Gynecology*. Also in 1959, the team presented initial results at the annual meeting of the North Pacific Surgical Association.

Their work was significant on two counts: first, for its endorsement of the preperitoneal approach, and second, for use of a new material to buttress the hernia repair. “We reported for the first time the use of synthetic prosthetic material (compressed Ivalon) to buttress the repair posteriorly,” noted Nyhus. Many more
The concept of approaching hernias of the groin from inside the inguino-abdominal wall rather than outside began with Cheatle (1920) and Henry (1936), who utilized such an approach for the repair of femoral hernias. Through succeeding decades this concept failed to gain widespread acceptance, except possibly in the treatment of femoral hernia. Few surgeons advocated such an approach for other groin hernias.

It has not been generally recognized that tissues are made available by the preperitoneal approach for simple, yet apparently adequate repair of all types of groin hernias. This apparently radical statement is based upon our experience in the anatomic laboratory, and on our utilization during the past six years of the preperitoneal approach for the repair of over 400 separate inguinal and femoral hernias in nearly 300 patients. The key to success of this preperitoneal technic is a thorough understanding of the transversalis fascia and its analogues, combined with proper utilization of these anatomic structures for repair, whether the hernia be femoral, indirect, or direct inguinal.

Between 5 percent and 30 percent of patients undergoing a hernial repair [in the United States] suffer a recurrence of their hernia. Most recurrences following primary hernial repair are due directly to a failure of the surgeon to restore anatomic integrity to the groin. Technically poor repairs are due, in large measure, to a misunderstanding of the surgical anatomy of the groin and a failure to adequately expose the hernial sac and hernial defect.

In other words, the root cause of recurrence was not surgeons’ lack of skill but the limited knowledge available about the anatomic details in the region. The team’s presentation continued:

The treatment of groin hernias remains a surgical riddle despite many centuries of clinical and anatomic investigation. The exact incidence of groin hernia is difficult to determine; certainly they are common. It is estimated that there are a million men with unrepaired groin hernias in the United States. The mortality due to hernias is over 3,800 patients annually, a rate twice that for appendicitis…

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This presentation documented 408 hernia repair operations performed on 299 patients over a six-year period, including 69 secondary repairs for recurrence following a conventional anterior hernia repair performed previously by other surgeons. The patients were followed for an average of three years after surgery. Eight recurrences (2 percent) were identified among the 299 patients. These results clearly were superior to the 5–30 percent recurrence rate seen with the anterior approach.
A few months later, Nyhus presented the same results at a surgical assembly in Guadalajara, Mexico. With the viability of this radical preperitoneal approach becoming more apparent, Harkins, Nyhus and Condon gained recognition nationally and internationally as authorities on abdominal anatomy and hernia repair.

The advantages of preperitoneal hernioplasty were credible, as described by Harkins:

- **Direct exposure of hernial defects for minimal dissection and easier, more streamlined anatomic repair**;
- **Tissues of adequate strength to accomplish hernial repair either primarily or secondarily and without tension**;
- **Direct handling of sliding hernias eliminates the need for counter-incisions**;
- **Overall, the preperitoneal approach is a technically easier procedure, compared to the traditional posterior approach. It can be applied to massive or recurrent hernias, as well; and**
- **This approach offers something that had challenged surgeons for decades: a low recurrence rate.**

*Henry Harkins, Paper/scientific exhibit to American College of Surgeons, October 1961*

By 1963, the Washington team’s experience with preperitoneal hernia surgery had grown to more than 700 cases. Harkins was the first to call this technique the “Nyhus” preperitoneal repair for all groin hernias and described it as such to the Société International de Chirurgie (International Society of Surgery) at the Society’s 20th Congress, held that year in Rome, Italy.

Nonetheless, the preperitoneal approach met early resistance. The Washington team’s version of the posterior approach differed from the earlier Cheatle-Henry posterior approach in key ways. Although the inguinal wall was viewed posteriorly in both methods, “sufficient difficulty was encountered by many surgeons in applying our principles so that the method was not widely used,” said Nyhus.

Resistance to this new preperitoneal approach was understandable. Most surgeons had never been exposed to such a radical approach; learning the new technique would require them to view the anatomy from behind—completely opposite to their traditional orientation. It also would require surgeons to correct the defect from behind—again, completely counter to their traditional training and experience.

Over subsequent years, Nyhus devoted much time, energy and ink to explaining and promoting the preperitoneal approach to most groin hernia repairs, including inguinal hernia. As years passed, this approach gained broader acceptance. Nyhus’s own experience recorded overall favorable results with a stable, low recurrence rate over a 37-year period (1955–1992). His patients experienced lower total morbidity with notably lower late morbidity, less atrophy of the testes, and less neuropathy after surgery compared with results of the traditional anterior approach.

Perceived as visionaries in the field of hernia repair and abdominal anatomy, Harkins and Nyhus (and later, Condon) were well-situated to create an authoritative book on the subject. *Hernia* was first published in 1964 by Harkins and Nyhus. The second edition, published in 1978, was authored by Nyhus and Condon. For its fifth edition, Nyhus and Condon invited Keith A. Kelley, MD, of the Mayo Clinic-Scottsdale to write an introduction. Kelley replied: “I would be honored to write a foreword to
the new issue of your book entitled Hernia. I consider this book to be the book on hernia in the field. I, of course, still follow the Harkins-Nyhus-Condon method of hernia repair. ... My results with this method have been excellent, and I am indebted to you for teaching me about hernia repair.”

**Defining Anatomy: A Key to Technique**

Identifying key anatomic structures is fundamental to a successful operation, whether for hernia repair or other purposes. Nyhus and Condon played pivotal roles in defining the fine details of abdominal anatomy.

As Nyhus and Condon described, previous application of the preperitoneal approach was limited to repair of femoral hernias. The Washington group extended this approach to all types of groin hernia, including direct and indirect. This move became feasible only because of more intricate anatomic understanding of the inguinal region, based in large part on findings by Condon and Nyhus.

Condon’s and Nyhus’s reinvestigation of the surgical anatomy of the inguinal region revealed that the iliopubic tract, rather than the lacunar ligament, defines the abdominal ostium of the femoral sheath and forms the medial border of the femoral canal. Nyhus identified the iliopubic tract, a band of fibrous tissue that reinforces the transversalis fascia of the posterior inguinal wall. This ilioband is situated within—and inseparable from—the transversalis fascia in the central portion of the groin. Noting that “its course parallels that of the inguinal ligament,” Nyhus suggested that this parallel placement may account for some of the mislabeling of the iliopubic tract (an error that was prevalent at the time).

Nyhus described the iliopubic tract as “key to understanding the surgical anatomy of groin hernias, since all of the common hernias occur in relation to it.” For example, indirect hernia occurs by disruption of the transversalis fascia at the internal abdominal ring, so that the hernial sac passes outward above the iliopubic tract and lateral to the spermatic cord. In femoral hernia, the sac of the peritoneum and bowel protruding down the femoral canal passes beneath the iliopubic tract.

**Classifying Hernias by Type**

Hernias are common, yet vary dramatically in characteristics. Accordingly, clear definition of the precise location, type and degree of each hernia enables the surgeon to determine the most appropriate surgical intervention for that case.

Nyhus drew from his in-depth understanding of abdominal anatomy to create a system of nomenclature for describing different types of hernia and guiding surgeons’ decision-making. Nyhus’s classification system offered far more detail than previously existing classifications (until then, limited to “direct, indirect or femoral” or “small, indirect, medium indirect, large indirect or direct, or femoral”).

In a review of “Inguinal Hernia in the New Millennium,” Jorge Cervantes, MD, of the National University of Mexico noted, “One of the most popular classifications is the one used by Dr. Lloyd M. Nyhus, without doubt, one of the leading hernia surgeons of the 20th century.”

The Nyhus classification system expanded definitions into nine types of hernia, with key points of differentiation (see Appendix B). This detailed level of description offered surgeons a universal “language” for describing and understanding varied types of hernia.
Nyhus's writings covered a range of topics and reached around the world. His first journal article, published in 1953, focused on traumatic asphyxia (*U.S. Armed Forces Medicine Journal*). A half-century later in 2005, one of his final published articles was an invited commentary on hernia advances related to the work of S-S Chang, Y-S Shan, et al., published in the *World Journal of Surgery*.

Between the first and final articles, Nyhus’s name appeared in journals reaching from North America to Asia, Europe and South America. Most of his writing focused on hernia and ulcer, of course. Yet he also addressed subjects as diverse as general surgery, esophagocardiomyotomy, surgical residency selection and instruction, gluconeogenesis in cancer, reflux gastritis, applications of endoscopic Congo red testing related to gastric vagotomy, floppy Nissen fundoplication and operative ultrasonography—to name a few.

**A Plethora of Scientific Papers**

Publication of research papers was a natural outgrowth of Nyhus's research pursuits and surgical practice. Even when his clinical practice in surgery waned after 40 years in the operating room, Nyhus the scholar continued to write articles that provided historical perspectives on surgery or espoused his opinions regarding modern advances in surgical technique.

Late in his years, Nyhus published many articles about the history of surgical hernia repair. These writings included articles such as “Groin Hernia Repair: Past, Present and Future,” in *Problems in General Surgery*, (1995 with Philip Donahue); “Herniology 1948–1996: Evolution Toward Excellence” (based

Nyhus also enjoyed writing about surgical leaders of the past: Henry N. Harkins, Warren H. Cole, Samuel Wells, George Olander, Carlo Scuderi, Piero Pietri, Tilden Everson, Erik Amdrup, Ludwik Rydygier, Carl Beck and others. Many of his later writings paid homage to individuals whose work shaped the historical progression of surgical advances, especially in the field of hernia repair. Nyhus saluted the advances of Bassini (19th century, Italy), Cooper (1844, England), Lotheissen (1898, Germany), McVay (20th century, United States) and others.

Years after putting away his own surgical scrubs, Nyhus continued offering opinions and insights about advances in surgical techniques, particularly related to ulcer and hernia. In his writings about “the latest advances,” he often urged cautious optimism over blind acceptance of innovations.

Stewardship on Key Journals
As a key contributor to surgical studies at the University of Washington and as principal protégé of Harkins, Nyhus was relatively young when he gained recognition in broad surgical circles. While an associate professor, Nyhus in 1961 was invited to serve on the editorial board of the American Journal of Digestive Diseases. Over the next four decades, he served on editorial boards of journals representing surgeons throughout North and South America, Asia and Europe.

Nyhus’s stature as an internationally respected surgeon and researcher—along with his depth of experience as a medical writer in his own right—made him an ideal fit for editorial boards. His curriculum vitae lists his participation on editorial boards for nearly 30 journals representing a spectrum of surgical specialties, including general surgery, digestive diseases, surgical oncology, intensive care medicine and more.

Nyhus’s reputation for thorough and contemplative review of surgical advances earned him seats on the editorial boards of journals such as Archives of Surgery, Current Surgery (formerly Review of Surgery), World Journal of Surgery and Problems in General Surgery. He believed that scientific journals should stimulate debate, inquiry and contemplation, and used his positions on editorial boards to promote lively exchange of ideas. In his view, dialogue and debate challenged the status quo and could yield new insights over the long term.

His long association with Current Surgery demonstrates Nyhus’s commitment to an ongoing exchange of scientific ideas. For more than 30 years (1958–91), Nyhus was actively involved with this journal of the Association of Program Directors in Surgery. He joined as associate editor in 1958 alongside Harkins, who was then editor-in-chief. From the journal’s inception in 1943 until 1962, it was titled Quarterly Review of Surgery. In 1964, the journal’s frequency increased from quarterly to monthly, and its name changed to Review of Surgery. That same year, Nyhus took over as editor. When Harkins stepped down in 1967, he named
Nyhus as his successor in the editor-in-chief role. This move coincided with Nyhus’s preparations to lead the Department of Surgery at the University of Illinois.

Nyhus stepped into this editorial leadership role with enthusiasm. He was not one to merely accept submitted papers. Rather, he encouraged discussion about innovations in surgery. This approach gained momentum in 1978, when he oversaw another renaming of the journal—this time to *Current Surgery*.

The title change was more than semantics. As Nyhus wrote to the journal’s readers, the new title signaled “a renewed commitment to what a journal such as ours aspires to, that is, not only a comprehensive [catalog] of what is going on in the world of surgery, but also critical commentary on issues by renowned experts. Thus, in the future, the majority of abstracts published in this journal will be followed by editorial comment.” *Current Surgery* also adopted a semi-rotational editorial board to encourage a constant inflow of fresh thoughts. Editorials for each issue would be written by prominent surgeons, rather than by the editorial staff. “Editorials may incite some controversy, which is important and welcome,” said Nyhus.

Even when not chief editor, Nyhus often played an influential role on surgical journals. For example, he was instrumental in raising the stature of the *Asian Journal of Surgery*. When the *Asian Journal* was approved by the National Library of Medicine for the Index Medicus and Medline, the journal’s editor-in-chief wrote to Nyhus:

> We take this opportunity to express our gratitude for your support by giving precious comments on the *Journal*. Your contribution in the Editorial Board of our

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Active Leader of Surgical Societies

From early in his career, Nyhus was recognized in the broader field of surgery. Condon commented: “[At the University of Washington] Harkins taught Nyhus that it was important to join surgical organizations and support them. It was important to participate both nationally and internationally in academic surgical affairs.”

Nyhus’s 1961 visit to Queen’s Hospital in Hawaii as an associate professor and his 1962 admission to the American Surgical Association were precursors of what was to come. His name appeared more and more frequently in surgical journals and on book covers. He became a recurrent speaker at surgical forums in the United States and around the world. He continued to earn recognition among his surgical peers. Over time, he was elected to leadership roles in more than 20 surgical societies.

Nyhus’s first official step into association leadership came in 1967 when he took the helm of the Society of University Surgeons, coinciding with his move to Chicago. Election as the society’s president melded nicely with Nyhus’s new position as the first Warren H. Cole Professor at the University of Illinois and followed in the footsteps of his predecessors. Cole was the society’s president in 1941. Cole also had studied under Evarts Graham, chairman of surgery at Washington University in St.
The legacy of Lloyd M. Nyhus—surgeon, teacher, leader, author—can be seen in many areas: in anatomical insights and surgical advances that improved the outcome of hernia and ulcer operations, in the generation of surgeons to whom he taught surgical techniques and in whom he inspired an appreciation for research and a strong work ethic, among the generation that followed and learned from those Nyhus-trained surgeons, in the surgery department he grew at the University of Illinois, across the surgical bridges he built around the world, and through the countless pages he authored or edited for textbooks and journals.

Over the decades, Nyhus received many honors from near and far. Among them, the Lloyd M. Nyhus Endowed Chair in Surgery at the University of Illinois at Chicago is perhaps the most tangible tribute to the man’s influence on the past and future of surgery.

### Nyhus’s Legacy

**Endowed Chair in Surgery—An Enduring Tribute**

The move to establish an endowed chair in surgery in Lloyd Nyhus’s name was initiated by those whom he had influenced.
most directly: his students. Said former resident James R. DeBord, who served as chairman of the campaign for the Nyhus Chair:

Many of us owe who we are today to the training we received in the program headed by Dr. Nyhus. This campaign is a way for us to thank our beloved professor and to honor him through a named chair. … We recognize that his [national and international] reputation in surgery rubbed off on all of us as his graduates and trainees.

James DeBord, MD, Clinical Professor of Surgery, University of Illinois College of Medicine, Peoria

The campaign for the Nyhus Chair began quietly in April 2002 but gained momentum the following June with a department-sponsored gala celebration of Nyhus’s 80th birthday. That event drew former colleagues, residents and research fellows from around the world. By September 2003, the campaign was over halfway to its $1.5 million goal. The campaign culminated in May 2007 with the university’s investiture of the Distinguished Lloyd M. Nyhus Chair in Surgery and the appointment of Pier Cristoforo Giulianotti, MD, as the first Lloyd Nyhus Professor of Surgery.

Nyhus was truly touched and humbled by the push for an endowed professorship in his name. He and Margaret were among the initial benefactors who provided significant financial support for the endowment. The campaign committee included 10 former and current UIC surgeons: Robert M. Arensman, MD; George E. Cruft, MD; James R. DeBord, MD; Philip E. Donahue, MD; Daniel P. Doody, MD; Ronald M. Johnson, MD; Lloyd M. Nyhus, MD; William D. Soper, MD; James J. Walsh, MD; and Larry R. Williams, MD.

The capital campaign for the endowment provided a platform for Nyhus’s most ardent admirers. Several of these individuals expressed their sentiments in a 2003 videotaped appeal for the endowment campaign. Praises were many and appeals were passionate.

Dr. Nyhus brought a lot of personal compassion into the hallways of the University of Illinois at Chicago. … He devoted a great deal of his life to developing this institution, and we would like to see that memorialized in an ongoing way through the Nyhus professorship. … He opened doors for us not only at UIC but opened doors for us throughout the world.

Robert Arensman, MD, Chief of pediatric surgery, Children’s Memorial Hospital, Chicago

Referring to Nyhus’s “effect on the local surgical community,” Donahue emphasized the importance of supporting the endowment:

It is important that the process of surgical education continues. This requires a strong faculty to develop new ideas and new techniques.

Philip Donahue, MD, Chief of general surgery, Cook County Hospital, Chicago

Urging those whose lives were touched by Nyhus to support the endowment of the Nyhus professorship, Herand Abarian said:

It is critical and crucial for everyone whose life was touched by Lloyd Nyhus to step up and contribute to fund this chair to its fullest. This is a small measure of thanks for people who—at a time when they were impressionable kids [residents]—were exposed to Nyhus’s knowledge, grace, generosity and kindness. Now that those “kids” are prominent surgeons in either universities or community hospitals, it’s very important for
University Chancellor Sylvia Manning began the evening’s remarks. Noting that “the importance of the medical college is deeply recognized across the University of Illinois,” Manning commented on her delight in witnessing establishment of the Nyhus Chair. Her own appointment to the university came in 2000, by which time Nyhus was virtually retired and on campus only a few days per month. She said, “It’s wonderful to complete the Nyhus Chair. To me, Dr. Nyhus has always been a legend. It’s wonderful to see the legend is not a myth.”

Manning noted that the Nyhus endowment would provide financial resources “to recruit the best in the world,” and offer the “prestige and stature” that accompany a named professorship.

Later that evening, Joseph Flaherty, MD, dean of the College of Medicine, spoke of Nyhus’s legacy as a teacher. “Lloyd Nyhus helped to produce a generation of the best surgeons the state of Illinois has ever had. Many of them were inspired to become teachers in their own right.” To describe Nyhus’s legacy, Flaherty paraphrased the words of Henry B. Adams, grandson and great-grandson of two U.S. presidents: “A great teacher affects eternity. You never see where their influence ends.”

Abcarian spoke that evening in more detail about the legacy of Lloyd Nyhus. His remarks touched upon many highlights of Nyhus’s career and his influence during a half-century. Among them, Abcarian noted:

- Nyhus’s and Harkins’s contributions to progress in ulcer and hernia surgery, including the vagotomy-antrectomy operation for ulcer and their book *Hernia*. (“This textbook has been the key reference for many years.”) Abcarian also acknowledged Bob Condon’s contributions to later editions of *Hernia*;
Chicago earmarks resources for premier research and teaching opportunities, and supports gifted faculty members as they pursue scholarly activities. At the time of the investiture in 2007, the Nyhus Chair was only the fourth named professorship in surgery at the University of Illinois at Chicago, following those previously named for Warren H. Cole (which Nyhus held), Clarence C. Saelhof (a urology professorship), and Turi Josefson.

The Nyhus Endowed Chair endures as a testament to the man whose vision built the Department of Surgery into a world-class department. "Nyhus expanded, developed and nurtured this department," said Donald K. Wood. "He brought it to the threshold of the 21st century as a vibrant, innovative department rooted in research and teaching."

Of course, Nyhus did not accomplish all of this alone. Yet he set the tone and served as a role model for the department and, therefore, is credited with its growth and maturation.

He assembled a team of outstanding surgeons among his initial faculty, including Condon, Bombeck, Das Gupta and Jonasson. He set the example for residency and fellowship training by fostering a mutual respect for surgeons at all levels of experience, by instilling a high regard for research, and by creating a dynamic program that thrived on learning.

Nyhus also is credited with expanding the Department of Surgery and reorganizing it into subspecialty divisions to reflect growing specialization within the discipline of surgery—while maintaining general surgery as the department’s fundamental core.

Further, the Nyhus Chair recognizes Nyhus’s role in forging relationships with other respected hospitals through the Metropolitan Group Hospitals and with Cook County Hospital.

Testament to a Visionary
An endowed chair is the highest honor that a university can bestow upon its faculty—a capstone of the academic careers of select few. The Nyhus endowment at the University of Illinois at Chicago earmarks resources for premier research and teaching opportunities, and supports gifted faculty members as they pursue scholarly activities. At the time of the investiture in 2007, the Nyhus Chair was only the fourth named professorship in surgery at the University of Illinois at Chicago, following those previously named for Warren H. Cole (which Nyhus held), Clarence C. Saelhof (a urology professorship), and Turi Josefson.

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and the West Side VA Hospital. These relationships extended the influence of the University of Illinois Department of Surgery and augmented the clinical experience of its residents.

Abercian aptly described Nyhus’s influence at the University of Illinois at Chicago: “During his 23 years as head of the department of surgery, Lloyd Nyhus took a department renowned for its residency program and its scientific and clinical research, and expanded it to new vistas. Along the way, he supported the careers of hundreds of young surgeons, both from the United States and many foreign countries. He made an indelible and enduring mark on the department.”

In establishing the Nyhus Endowed Chair in Surgery, the university recognized Nyhus’s exceptional leadership of the department for 23 years, his accomplishments in academic surgery, his

Giulianotti: First Nyhus Professor of Surgery
Pier Cristoforo Giulianotti, MD, was recruited from Italy in 2007 by transplant surgeon Enrico Benedetti (who subsequently became head of surgery at UIC). Giulianotti has been called a visionary, innovator and builder—many of the same traits associated with Nyhus. He is considered by many to be the foremost robotic surgeon worldwide, which is an apt distinction for the surgeon chosen as the first Lloyd M. Nyhus Professor of Surgery.

Giulianotti began exploring the potential of robotic surgery when the medium was in its infancy. He was the first in the world to use robotic methods to perform many complex procedures, including formal hepatic resection, lung resection and pancreaticoduodenectomy. He fine-tuned robotic surgery techniques for removing cancerous tissue from the lung and pancreas, and implemented robotic methods for operations on the esophagus, colon, stomach and liver. In Italy, he built the world’s largest robotic surgery program. He also

prominence in national and international surgery circles, and his excellence in writing several of the century’s definitive textbooks on surgery and anatomy.

A Culmination of Many Honors
The Nyhus Endowed Chair in Surgery was the pinnacle of the many honors and recognitions that Nyhus received during a half-century of accomplishments. However, it certainly was not the only honor that would ensure Nyhus’s legacy of teaching, research and leadership endures.

In the preceding years, several other awards and scholarships were established in Nyhus’s name, including:
- The Lloyd M. Nyhus Prize, established in 1992 by the Warren H. Cole Society. This prize recognizes Nyhus’s

continues to use traditional open and minimally invasive surgical approaches whenever these are better suited to the patient’s care.

Speaking at the investiture for the Nyhus Chair and his formal introduction to the University of Illinois Department of Surgery, Giulianotti said, “I am deeply moved by this honor. I will do my best to follow Dr. Nyhus’s [example].”

Giulianotti’s appointment also demonstrated the march of progress and change in the field of surgery. In addition to being named the Nyhus Professor of Surgery, Giulianotti was appointed chief of the newly created Division of General, Minimally Invasive and Robotic Surgery at UIC Medical Center. In January 2007, he was elected president of the one-year-old internationally based Minimally Invasive and Robotics Association.

On top of his accomplishments as a surgeon, Giulianotti also is a talented pianist. His musical prowess was demonstrated during a recital performance at the investiture dinner, accompanied by pianist/violinist Alvise Pascucci.
Like Peterson, many who studied or began their careers in surgery or research during Nyhus's years at UIC were fervent in their admiration for the surgical residency program, the vibrancy of the surgery program, and their leader. This admiration and appreciation is what compelled former residents, medical students and others to establish the Nyhus Chair in Surgery and to stay in touch with Nyhus long after they left the university.

“Nyhus ran a world-class surgery department at the University of Illinois,” said Wood, who was among Nyhus’s first group of trainees at Illinois and remained one of his strongest admirers throughout Nyhus’s life and after his death. “Dr. Nyhus created an environment that prepared and inspired so many surgery graduates to continue in academic surgery and to become prominent in their professional medical careers.” In addition to teaching surgical technique, Nyhus encouraged young surgeons to integrate research and inquiry into their clinical work. His leadership inspired many to pursue careers in academic surgery, and many former residents later became leaders at academic medical centers. His legacy continues through the several hundred residents he trained and, in turn, through the following generations of surgeons whom the Nyhus trainees will subsequently influence.

Cultivating Surgical Research into the Future

Nyhus’s influence on subsequent generations of surgeons was not taken lightly by those he mentored. A letter Nyhus received while he was head of surgery suggests the level of admiration felt by many of his students and colleagues:

Many, many thanks for arranging the award that you so graciously gave to me last Friday night. This was a highlight in my life and I kid you not! I sat there looking over the crowd of the young men that I have helped you develop, and this probably gives a guy the greatest self-esteem and thrill, as you very well know, of anything accomplished in medicine. You certainly attract to you and your department a great bunch of [surgeons] … I shall never forget Lloyd Nyhus!

Letter from Lowell F. Peterson, MD, Hinsdale Women’s Clinic, Hinsdale, Illinois, June 18, 1974

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Cultivating Surgical Research into the Future

Nyhus left his imprint on the field of surgery in many ways. Among them was his commitment to the pursuit of surgical research—a commitment that he conveyed to developing surgeons as a critical component of their residency experience. Throughout his career, Nyhus moved seamlessly between the
supported education-related travel expenses for faculty and residents, enabling surgeons from the University of Illinois at Chicago to attend key conferences around the United States and the world.

Once LISS was established, Nyhus continued to seek funding sources to ensure its ongoing mission of advancing surgical research and intellectual stimulation. He noted a few years later, “The Living Institute for Surgical Studies has opened new vistas to our trainees and faculty unforeseen in our history. Yet, in this age of molecular biology, it is imperative that we move with this tide of new knowledge. Unless adequate resources are made available, the LISS will lose its momentum in attracting the finest house officers and surgical faculty to our midst. The Department of Surgery and its Living Institute, given sufficient resources, assures its friends a dedication to intellectual excellence and leadership—whether at the medical student, resident or faculty level.”

By 2004, the Living Institute held $2.8 million in endowment. Its annual report noted:

[In 1985] Dr. Lloyd M. Nyhus, then-head of the Department of Surgery... realized a dream. It came in the form of the Living Institute for Surgical Studies (LISS), an effort that attracts funding to promote and upgrade the level of education, research, and patient care in the Department of Surgery. The LISS links all privately generated endowment funds in the Department of Surgery and yields income annually for a variety of uses: endowed chairs, professorships, research awards, travel awards for faculty and residents, symposia awards to visiting scientists, scholarships...
LISS is committed to opening the doors for new research and discoveries in the field of surgery, bringing the world's leading surgical experts to UIC, and providing support for students of exceptional promise.

Nyhus demonstrated his commitment to the pursuit of research and teaching by making personal donations to support LISS and other initiatives at UIC. Lloyd and Margaret Nyhus’s donations over the years were recognized in the university’s 2002 annual report, with lifetime gifts of more than $100,000.

In later years under the leadership of Abcarian as UIC head of surgery, LISS evolved into the Department of Surgery Research Fund. This more general fund consolidated all contributions to the Department of Surgery under a single umbrella fund, still directed to support surgical research and education. Some time after the campaign began for the Nyhus Chair, monies remaining in the Surgery Research Fund were transferred to support the endowed chair—a move aimed at providing continuing support for surgical research and education while also honoring the man whose vision ensured the continuation of surgical research at the University of Illinois at Chicago.

Promoting Surgical Research in the Global Setting
Nyhus’s commitment to the march of surgical research extended beyond Chicago; he recognized the importance of promoting surgical research worldwide. In 1993, during his term as president of ISS/SIC, Nyhus spearheaded establishment of the International Society of Surgery Foundation (ISSF). Like the Living Institute for Surgical Studies at the University of Illinois, the International Society of Surgery Foundation was established to promote and finance significant surgical research and educational activities. The latter, of course, has an international focus that supports research fellowships, seminars, education-based travel, and a lively exchange of scientific information and knowledge. The international foundation leans toward supporting research and teaching activities of surgery students from underdeveloped nations where alternative funding resources are especially limited.

Creation of ISSF was a landmark in Nyhus’s two-decade active involvement with the ISS/SIC, and he stepped up as one of the foundation’s initial major benefactors. He also sought broad support for surgical research and advanced educational opportunities.

A Lasting Impression
Across the world and close to home, Nyhus’s lifetime of work and dedication left a lasting imprint on surgeons, researchers, patients and the discipline of surgery. His technical innovations—particularly in ulcer and hernia repair—improved long-term outcomes for countless patients years before advances in medication and laparoscopy changed the course of treatment for these common ailments. His efforts encouraged and enabled the ongoing pursuit of surgical research at the University of Illinois and abroad. As a teacher, mentor and thought leader, Nyhus shaped the careers and futures of two generations of surgeons—those with whom he worked directly in Seattle and Chicago, and many who learned from his writings and presentations.

As a leader in major surgical associations, he helped steer the discipline of surgery as it approached the 21st century—guiding...
the transition period between the era of the generalist to an era of growing specialization and rapid advancements. “Nyhuis influenced American and world surgery at a pivotal period in the history of surgery,” said Wood.

At the University of Illinois during the late 1960s and into the 70s, Nyhus had the foresight to establish distinct divisions of surgical subspecialties—a model which later became the norm at other academic medical centers. He built the University of Illinois Department of Surgery into one of the leading surgical departments in the United States and the world. Under Nyhus’s leadership, the department earned recognition on many fronts: for its dynamic research activities and innovation, its abundant training opportunities realized through partnerships with other hospitals, its foresight in delineating surgical specialties under the umbrella of general surgery, and its early step into the global realm of surgery by welcoming an international body of surgeons to study, research, lecture and perform operations.

“Those who know Lloyd Nyhus have valued his persona and been enriched by his warmth. We have come to know him as an individual and as a person, and have profited greatly. … While the full effects of his career and [23] years at the helm of the University of Illinois Department of Surgery cannot be completely portrayed in a single collection of papers, they provide some insights about a wonderful leader, teacher, and role model. These works convey our high regard for a great chief, one of our best teachers, and one of our best friends. We shall not soon see the likes of him again.”

Festschrift, 1996

Remembrances

Autumn 2007

A year had passed since Lloyd lost Margaret, his wife of 57 years. Her death left a void in his days.

With Margaret gone, and their children Sheila and Leif long-since grown up, the family house was too large and quiet for just one man. Nyhus moved to a nursing home nearby. He walked the long halls daily, enjoying friendly regards from nurses and staff who greeted him as “the Doctor.” He was always ready with a joke, chuckle and a wink.

His health was in decline, yet his spirits remained high.

Autumn 2008

As a cold Chicago winter approached, Nyhus spent more of his days resting with eyes closed—perhaps recollecting a lifetime robust with many accomplishments, recognitions, travels, loved ones, colleagues and students. The walls and bookshelves of his room held photos of family and friends—mementos of times past.
Nyhus’s final weeks were quiet. His son Leif visited him often, as he had done countless times in the years since Margaret’s passing. Leif took his father to restaurants for mid-week dinners and to church on Sundays. Sheila traveled from Oregon to visit her father at Thanksgiving-time. Throughout his waning weeks, Nyhus spoke of his two grown children and his grandsons with great pride.

By late November, Nyhus’s pace had slowed dramatically. Don Wood and June Svec visited him for what they sensed would be their final meeting. Nyhus did not talk, but nodded as Wood and Svec spoke to him. He took Svec’s hand and kissed it—a sign of appreciation for her steadfast support as his personal assistant, secretary and friend for so many years. His pulse was strong and regular; he appeared neither in pain nor discomfort as he rested.

Wood was shaken by his visit and Nyhus’s decline since a visit just three weeks earlier. He said, “I look at pictures of Dr. Nyhus, remember operating with him, the interactions of over 40 years, and I feel a deep sense of gratitude to God for a man who served others very well.”

Nyhus passed away on Monday, December 15, 2008. Wood wrote to colleagues in the University of Illinois Warren H. Cole Society:

Lloyd M. Nyhus passed away peacefully last evening, December 15th. …

His life impacted so many and his contributions to the surgical community, the Department of Surgery, the University of Illinois, and his worldwide reputation will be remembered. He was a kind gentleman, an outstanding surgeon, a mentor and visionary for 20th century surgery.

Condolences and remembrances of Nyhus poured in from around the world. The words of many who knew Lloyd Nyhus convey the gratitude, admiration and respect that he earned during a half-century in surgery.

A very important part of me is gone and I will surely miss him. I am so glad I visited him this summer at the nursing home. He was chipper and up and talking about his family. … I owe him more than I can say.

Jim DeBord, MD

There was a kindness within him that placed everyone at ease. He was a credit to the department of surgery at the University of Illinois and was a man with great personal integrity, which reflected on all he met. We have lost a fine gentleman, but his time on earth made life better for all people with whom he made a contact.

Banning G. Lary, MD

He will always be in my heart as a most superb educator, a gentleman, and a wonderful person to get in touch with.

Hanafy M. Hanafy, MD

As one of Professor Nyhus’s most distant disciples, I will mourn his loss from a Southern Midsummer, rather than a Midwestern Midwinter. The impact that Professor Nyhus had on my career is incalculable. He took a significant risk and gave me my first academic appointment, and I know that he was pleased when I took up my current position.

Kevin Pringle, MD, New Zealand

Surgery has lost one of its Founding Fathers.

Paul Levy, MD
Milestones in Hernia Repair

Worldwide, Nyhus is best remembered for his contributions in the field of hernia. Although delighted with the recognition, Nyhus also acknowledged the work of predecessors whose achievements and even disappointments contributed to the evolution of surgical repair for hernia.

Particularly in his later years, Nyhus wrote and spoke extensively about pioneers and milestones that advanced and enhanced hernia surgery. Following are select historical highlights, as gleaned from Nyhus’s writings. (Author’s note: It is unclear whether Nyhus formally presented or published these remarks. These historical notations and Nyhus’s comments are excerpted from papers in Nyhus’s extensive files. The comments offer Nyhus’s perspective on some of the most significant contributions to surgical hernia repair. Those who have studied hernia repair undoubtedly have heard most of these names.)

Nyhus offered this view of select major milestones in hernia repair, including some of his own contributions.

Milestone 1: Billroth’s vision—Billroth, speaking to his pupil, Czerny, in 1878: “If we could artificially produce tissues of the density and toughness of fascia and tendon, the secret of the radical cure of hernia would be discovered.”

Milestone 2: Metal prostheses—Ancient Greeks, Romans and medieval surgeons used gold as a suture material because gold is well-tolerated by the body. Bassini of Italy used silk sutures. William Halsted began with silk, but concern about the incidence of post-repair sepsis compelled him to switch to silver wire. (At the time, the bactericidal properties of silver were under study by bacteriologist Bolton at Johns Hopkins.) Phelps (1894) first used
silver coils to reinforce the silver sutures. Witzel and Goepel of Germany expanded the coil idea into silver mesh (1900), which was widely used until the 1960s. Stainless steel began replacing silver in 1929.

**Milestone 3: Nylon suture and mesh**—Synthesis of plastics was among the greatest commercial development of the 20th century. Nylon was used first by Melick in 1942. Eventually, nylon was replaced by other plastics because it lost its tensile strength over time and was vulnerable to infection.

**Milestone 4: Polypropylene**—Usher (1955), a surgeon at Baylor University with a degree in pharmacology, saw an ad in Life magazine describing Marlex, a new polyolefin product made of crystalline ethylene polymer. He was intrigued by the product’s properties: Marlex can be extruded as monofilament, is strong, is inert, is unwettable, resists fragmenting, and resists boiling. In 1958, Usher reported his findings from repair of inguinal and incisional herniation using Marlex.

By 1962, an estimated 20 percent of U.S. surgeons were following Usher’s recommendation to use the Marlex material. This form of polypropylene offered notable benefits: it could be knitted, could be autoclaved, and held firm borders with two-way stretch. In tissues, polypropylene set up an initial inflammatory response with later fibrosis that enhanced strength of the wound.

**Milestone 5: Usher’s technical advances**—Despite opposition from leading surgeons of the time, Usher laid the groundwork for the subsequent widespread use of prosthetic repair in herniology. Usher single-handedly supervised the development of the best prosthesis and, in a series of 20 papers published from 1958 to 1963, introduced a number of technical innovations. In 1958, for example, he introduced deep placement of prostheses in the groin and for application in treating incisional herniation.

**Milestone 6: Dacron mesh, Mersilene**—First used in 1939 in England, Dacron is a polymer of ethylene glycol and terephthalic acid. It was introduced to herniology by Wolstenholme (1956). Others promoted the use of Dacron, including Rives (1967), his students Stoppa (1969) and Flament (1973), as well as Wantz. However, most surgeons preferred polypropylene because of its monofilamentous nature, which made it more resistant to infection. Leber et al. (1996) advised against use of Dacron.

**Milestone 7: Stoppa’s contributions**—Beginning in 1969, this outstanding French herniologist not only championed Usher’s concepts regarding prosthetic repair, but advanced several of his own. Stoppa inserted large overlap-
Milestone 10: Prosthetic plug—Some surgeons say the plug (a foreign material) is not necessary, while others opt to use it. Some use an inguinal plug accompanied by subaponeurotic patch with transplantation of the spermatic cord. In 1998 Gilbert and Graham introduced a bi-layered plug device. Each option on its own has shown to be curative, yet the plug may not be universally necessary. “Do we need a belt and suspenders?”

Milestone 11: Teflon mesh, ePTFE—This important advance was discovered accidentally. In 1938, Plunkett, a chemist at DuPont Company, was experimenting with gases related to refrigerants when he found a small sample that had frozen and crystalized into a white, waxy solid. The material was slippery and inert, yet nothing would stick to it. It took DuPont five years to find an application for the substance: Teflon. Teflon was introduced to hernia surgery in 1959, yet was not used because it does not resist infection and contributes to high recurrence rates. In 1963 in Japan, Teflon was expanded into a high-strength porous material. By 1980, Teflon was being used in hernial prostheses. In time, however, Marlex gained popularity over Teflon as the mesh of choice for surgical repairs.

Milestone 12: Laparoscopic prosthetic repair—This surgical technique evolved from endoscopy (Hippocrates 460–375 BC), light mirrors (Arabia 1000 AD), and the medical telescope (Bozzini 1806), with other advances in the interim. The major breakthrough was the computer chip video camera (1986), which allowed extensive surgical applications and enabled assistants and teachers to participate. The remarkable success of laparoscopic cholecystectomy (Mouret 1987) encouraged the use of this new technology in herniology. Arregui et al. adopted Stoppa’s GPRVS technique using a trans-abdominal preperitoneal approach (TAPP). In 1993, McKernan and Laws performed a completely extraperitoneal procedure (TEP)—which became the technique of choice among most laparoscopists.

In the groin, laparoscopy is particularly useful in the repair of bilateral and recurrent defects, since both sides can be operated on at one time and scarred blood vessels and nerves are not disturbed.

Milestone 13: Connective tissue disease in adults with hernia—In 1964, Wirtschafter and Bentley suggested that a maturation defect of collagen may be responsible for congenital hernias, based on research with rats. In 1970, Nyhus noticed attenuation of the rectus sheath among veterans with inguinal herniation. Culture studies showed systemically diminished fibroblast synthesis of an abnormal collagen.

Data from studies by Nyhus, Freidman et al. (1993), Jackson et al. (1996) and others led to the recent decline of sutured herniorrhaphy.

Based on these findings, Nyhus wrote in the mid-1990s: “The fact that tissues surrounding hernial defects may be diseased means that surgeons can no longer, as a routine, close them by bringing musculotendinous structures together under tension. Recurrence cannot be blamed, simply, on technique, infection or inadequate rehabilitation. This realization that, in the adult, connective tissue pathology is not only a cause of primary herniation but its presence can prevent cure, underpins prosthetic repair. … The challenge today is to develop preoperative tests which can identify the incidence and extent of tissue damage preoperatively.”

Popular approaches for hernia repair during this time period (mid/late 1990s) included use of polypropylene mesh and tensionless repair and parietalization of the spermatic cord.

Nyhus commented: “The enormous problem of incisional herniation (Ellis 1980s) has fortunately been controlled by prefascial, retrorectus repair (Rives and Flamant 1973). Laparoscopists, competitive in the abdomen, are using intraperitoneal ePTFE since it evokes few adhesions. Recent data indicating that acquired or genetic-based connective tissue disease is a cause of herniation in the adult, along with aging, all but mandates prosthetic repair to prevent recurrence.”

Earlier Pioneers in Surgical Hernia Repair

Nyhus always gave nod to past pioneers who provided building-block foundations for subsequent advances. Likewise, W.Y. Lau, MD, (University of Hong Kong) also reviewed historical milestones. Following are some of the pioneers Nyhus and Lau cited (including some overlap with the milestones described above).

- Astley Cooper (1804) identified the transversalis fascia and demonstrated its importance in groin herniation.
- Eduardo Bassini (1887) is credited with pioneering the modern era of hernia repair. His “triple layer” repair was corrupted over the years, so he received limited credit for his attention to the posterior inguinal wall.
- Working in the same time period as Bassini, William S. Halsted developed an operation for treatment of inguinal hernia, which became known as the Halsted I procedure. The key differentiation from the Bassini procedure was that Halsted used transposition of the cord to a position above the external oblique aponeurosis. Both Bassini and Halsted established the fourth principle of inguinal herniorrhaphy: reconstruction of the posterior inguinal floor.
Advances in sanitation also supported surgical progress. In the 1890s, Halsted introduced usage of surgical gloves. His emphasis on sterile conditions in the operating room expanded the surgeon’s access to the body. Halsted also pioneered methods for bleeding control and wound closure, which later proved essential in hernia surgery.

Von Mickulicz translated antiseptic surgery to aseptic surgery in 1904, setting the scene for the techniques of modern hernia surgery to unfold.

The use of the iliopsoas ligament (Cooper’s ligament) to anchor the medial parietal wall in the repair was another landmark in inguinal hernia surgery (Georg Lotheissen, Austria, 1898). This innovation was ignored until 1949 when it was revived by Seeling and Tuhalske, and Chester B. McVay and Barry J. Anson. Another ligament, the iliopubic tract, is also important to the full understanding of hernia repair … its importance in the preperitoneal approach to repair has been emphasized by Nyhus et al.

Halsted II repair: In 1903, Halsted abandoned cord skeletonization … and adopted Andrew’s imbrication and the Wölfer-Berger technique of a relaxing incision and a rectus sheath flap. Unlike Berger, Halsted did not repair the defect in the sheath.

U.C. Bates of Seattle is credited with further advancing the concept of preperitoneal approach in 1913. Bates repaired the defect from the posterior approach using transversalis fascia. This technique had significant historical impact. Although McEvedy is usually credited with exposure of the preperitoneal space lateral to the rectus abdominis muscle (in contrast to the vertical linea alba incision of Chestle and Henry), the words of Bates suggest that in 1913 he pioneered this lateral transverse incision.

Henri Fruchaud presented the concept of the myopectineal orifice. He recommended complete reconstruction of the transversalis fascia within this posterior inguinal wall complex. He also provided illustrated texts of the iliopubic tract, which helped to expand surgeons’ understanding of anatomical structures.

During World War II, Edward Shouldice pioneered a technique to repair hernia defect layer by layer within the abdominal wall, with overlapping margins that reinforce the muscular wall. Still in use by many surgeons [at the time of this writing in 2002], the Shouldice technique eliminated the need for synthetic mesh in most cases.

Chester McVay renewed interest in the Cooper’s ligament and posterior inguinal wall as crucial to groin hernia repair.

Surgeons from University of Washington-Seattle (Harkins/Nyhus group) and University of Illinois-Chicago (Nyhus group) fine-tuned approaches to the posterior inguinal wall. They paved the way for several techniques used in posterior hernia operations.

Francis Usher (1950s) is remembered for his many advances. Most notably, he pioneered usage of prosthetic mesh (polypropylene/Marlex). He began the usage of mesh in difficult hernia operations. Usher also replaced overlay reinforcement of sutured repairs with inlay tension-free bridging of hernia defects. He introduced anterior preperitoneal prosthetic replacement of the transversalis fascial floor of the inguinal canal. His unsplit groin prostheses provided lateral, preperitoneal paraphetalization of the spermatic cord, thereby maintaining obliquity of the internal ring.

Robert E. Condon (1964) demonstrated the fallacy of the shelving edge of the inguinal ligament during anatomic dissections of autopsy specimens.

René Stoppa of France reminded surgeons of the Pascal hydrostatic principle and demonstrated how intra-abdominal pressure enables giant prostheses to remain in the preperitoneal space without the need for sutures. This allowed the hernia orifice to be covered permanently. Stoppa also found that the mesh was maintained in place without suturing to abdominal wall. (Until then, blind suturing to the abdominal wall from anterior and posterior positions had been fraught with many complications, including damage to the regional nerves.) Stoppa facilitated the evolution of large, ventral incisional hernia repair.

Selective use of prosthetic buttress was introduced in 1975.

Laparoscopic hernia repair was introduced in 1990.

Commenting on the preperitoneal approach (modifying the Chester-Henry approach by using a unilateral incision obliquely placed in the lateral portion of the rectus sheath, dividing the underlying fascia, retracting the rectus muscle medially, and approaching the femoral herniation from above in the preperitoneal plane), Lau wrote:

Read (1968) and McVay (1966) are among those who have reported on this [preperitoneal] approach, but it was Nyhus and associates (Bombeck and Condon) who established it firmly as
a sound operation based on detailed anatomic and clinical studies. In 1959 they used for the first time a synthetic mesh (Ivalon) to buttress the posterior wall repair; the preperitoneal approach has been favored by French surgeons as well. Rignault recommended it together with the use of prosthesis. Stoppa used this approach for GPRVS. Rosenthal and Walters of the United States used the preperitoneal approach to repair hernias with prostheses. Malangoni and Condon recommended the preperitoneal approach for incarcerated and strangulated hernias.

Because of the contributions of Nyhus, J.F. Patiño of Bogota has proposed that the preperitoneal approach and repair be known as the Nyhus operation, although this Nyhus eponym was first used as far back as in 1963 by Henry Harkins.

The evolution of technical innovations in hernia repair and evaluation of each innovation’s worthiness will no doubt continue. This appendix serves as a resource for surgical residents and practitioners to recall the long journey that has led to techniques currently in use.

Hernia Classifications—Nyhus Approach

Nyhus was one of many surgeons who developed nomenclature systems to standardize descriptions and discussions of the broad diversity of hernia types. For general discussions, Nyhus’s classification system was outlined as follows.

- **Type I** Indirect, small
- **Type II** Indirect, medium
- **Type III**
  - A) Direct
  - B) Indirect, large
  - C) Femoral
- **Type IV** Recurrent
  - A) Direct
  - B) Indirect
  - C) Femoral
  - D) Combinations of A, B, C above

*Nyhus and Condon’s Hernia, Fifth Edition*

A more detailed version of the Nyhus classification appears on the following page:
Nyhus Classification of Inguinal Hernias

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Indirect inguinal hernia. Internal abdominal ring is normal size, configuration and structure. Typically occurs in infants, children, young adults.</td>
</tr>
<tr>
<td>II</td>
<td>Indirect inguinal hernia. Internal ring is enlarged and distorted, without impinging on posterior wall. Hernial sac is not in the scrotum but may occupy the entire inguinal canal.</td>
</tr>
<tr>
<td>III</td>
<td>Direct inguinal hernia. Protrusion does not herniate through the internal abdominal (inguinal) ring. All direct hernias (small or large) are Type IIIA.</td>
</tr>
<tr>
<td>III (B)</td>
<td>Indirect inguinal hernia with large dilated ring that has expanded medially and encroaches on the posterior inguinal wall (floor) to a greater or lesser degree. The hernial sac frequently is in the scrotum. These sliding hernias always destroy a portion of the posterior wall of the inguinal canal. (The internal abdominal ring may be dilated without displacement of the inferior epigastric vessels. Direct and indirect components of the hernial sac may straddle those vessels to form a pantaloon hernia.)</td>
</tr>
<tr>
<td>III (C)</td>
<td>Femoral hernia; a specialized type of posterior wall defect.</td>
</tr>
<tr>
<td>IV</td>
<td>Recurrent hernia. Can be direct, indirect, femoral, or a combination of these types. Recurrent hernias cause intricate management problems and carry a higher morbidity than other hernias.</td>
</tr>
</tbody>
</table>


General citations used extensively throughout book:
Nyhus, Lloyd M. Curriculum Vitae.
Untitled letters, correspondence, presentation notes and other writings from Dr. Nyhus’s extensive collection of personal papers.
Author’s Note

Dr. Nyhus, Dr. Wood and I collaborated for several years on this book. It was my honor to learn about Dr. Nyhus’s life and influence during our visits and by poring through the stuffed folders and countless documents he gave me to read. It also was my honor to know this special man during the late stages in his life, as he and others looked back on the legacy of his lifetime.

We met many times in Dr. Nyhus’s home office: a tiny room above the garage, accessible only by precarious stairs. Dr. Nyhus never hesitated to climb those stairs, even when they were slippery with snow and ice. In that office, the memories and stories flowed. Dr. Nyhus shared many stories about people and events—from his earliest childhood memories and tales of his ancestors, to anecdotes about his family and university friends, to his final impressions as an emeritus professor and retired surgeon.

Stifling in the summer, drafty in the winter, the office was filled with stacks of books, photographs and several hundred manila folders—each one holding paper reminders of his decades as a teacher, healer and leader. The folders contained personal letters he received, copies of letters he wrote, speech notes, journal articles, newspaper clippings, photographs from his travels worldwide, memorial booklets from the funerals of friends, and much more. It seemed that he saved everything!

Among the favorite documents Dr. Nyhus saved were personal letters he received from former students, residents, fellows and colleagues at the University of Illinois and across the globe. Many of these letters have been excerpted in this book. I gratefully

Appendix B—Hernia Classifications: Nyhus Approach

I would like to extend gratitude to the many people who made creation of this book possible:

A very special thank you to Donald K. Wood, MD. Your vision, dedication, personal recollections and fervent loyalty to Dr. Nyhus were the inspiration behind this book. Your direction, enthusiasm, encouragement, support and patience helped me turn your vision for this book into reality.

A heartfelt thank you to Lloyd Nyhus himself—for sharing stories, documents and memories of your inspiring life.

Thank you to:

June Svec—for your tireless reading of the entire manuscript and your memories of people and times past.

Catherine Judge Allen—for your expert editing skills.

Jeffrey and Linda Swoger, for their design work and moving this project from mere manuscript into a completed book.

Robert Schmitz, Robert Condon, Bob Baker, Walford Gillison and many other surgical colleagues who shared memories and kind words about their years with Dr. Nyhus.

Dr. Nyhus’s family—for adding insight to the personal side of the man who many knew as a great surgeon, teacher and leader.

The UIC College of Medicine-Department of Surgery and Warren H. Cole Society—for financial support and belief that this book should be written. And, notably, Enrico Benedetti, who followed in Dr. Nyhus's footsteps as Warren H. Cole Chair in Surgery and head of Surgery, and whose unconditional support helped carry this book to the finish line.

Thanks also to you, the reader.
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