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Triumphs and Controversies in Laparoscopy: The Past, the Present, and the Future

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Dear respected members of the Society,
ladies, and gentlemen:

Let me express my deepest appreciation to you for allowing me to lead our society over the past year.

My first thoughts today, at the anniversary of September 11, reflect on one of the darkest days in our history. The senseless act of terrorism should forever remind us of the fragility and importance of life. As medical professionals and scientists, we should also be reminded that knowledge and its pursuit are the only defenses against terror. We shall pay tribute to the memory of all lost in the tragic event with a moment of silence. The events of September 11, 2001 inevitably triggered social and economic adversity that has changed many lives. We are all engaged in the painful task of adjustment. Historically, adversity has been the base for the recognition of necessity, as well as a conditional aspect of creativity and the development of innovative and revolutionary ideas. Many triumphant developments follow the path of painful struggle. I view advanced operative endoscopy as a revolutionizing surgical advancement arising from the need to overcome ancient stagnated surgical methods. Allow me today to summarize some of the developmental triumphs and political roadblocks of laparoscopic surgery and to share with you my thoughts regarding future steps toward success and broad acceptance of this surgical technique as a viable and acceptable alternative to laparotomy.

The beginning of the modern endoscopic/laparoscopic era is the early 19th century when Phillip Bozzini1 described a cystoscope (1805). This early endoscope consisted of a complex system of reflecting mirrors, candles, and a urethral cannula. It successfully brought light into the internal cavities of the body and redirected it into the eye of the observer. Although a part of the medical society of Vienna declared his invention to be ingenuous, Bozzini[1] became a victim of close-mindedness for being ahead of his time. He was censured by the Medical Faculty of Vienna for "undue curiosity." Although this early cystoscope was never used on humans, the concept inspired many others.

A crucial breakthrough for providing a light source was the invention of the electric bulb by Edison in 1879. This was almost immediately used by Maximillian Nitze[2] who, in collaboration with Josef Leiter, developed the first rigid endoscopic instrument with a built-in light source, which was primarily used for urologic procedures and soon thereafter in upper gastrointestinal tract procedures. By the end of the 19th century, endoscopes had been well established as a means of evaluating the urinary tract, anorectum, larynx, esophagus, and stomach. Although the chest and abdomen were not yet accessible, the methodology had been developed for this possibility.

Performance of the first laparoscopic procedure is attributed to George Kelling,[3] a surgeon from Dresden, Germany, who inserted a cystoscope into a living dog through a small incision in the abdominal wall and examined the peritoneal cavity by using pneumoperitoneum for better visualization. The procedure was called celioscopy. He applied the method in humans in 1910, but he was not the first to publish about it. Stockholm's surgeon, Hans Christian Jacobeus,[4] adopted the technique, named it laparoscopy, and in 1910 published his experience about the use of laparoscopy in 17 patients, as well as his experience in thoracoscopy in 2 patients.

At almost the same time, Bertram Bernheim performed the first laparoscopic procedure in the United States at Johns Hopkins University Hospital in 1911. He inserted a 12-mm proctoscope through an epigastric incision to inspect the peritoneal cavity in a jaundiced patient. In the following years, laparoscopy became an accepted

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diagnostic procedure. Because of its limited therapeutic applicability, the enthusiasm of general surgeons for the technique started to fade. Gynecologists became the users and advocates of this approach. Zollikofer, a Swiss gynecologist, introduced carbon dioxide to create pneumoperitoneum in 1924 (instead of filtered air or oxygen because of its fast absorption and to minimize the risk of explosion).

In the early 1930s, the first reports of laparoscopic intervention with therapeutic purposes were published. Fervers, a gynecologist, was the first to describe therapeutic laparoscopy when he divided intraabdominal adhesions by electrocautery. At the same time in the United States, lysis of abdominal adhesions and diagnostic biopsies under direct visualization were the most commonly described laparoscopic procedures. In addition, the first laparoscopic tubal ligation by electrocoagulation was performed in 1936 by Boesch in Switzerland, and in 1941 by Power and Barnes in Ann Arbor, Michigan. Scientific exchange during this time suffered because of the difficulties imposed by political agendas between World Wars. In 1938, the Hungarian physician, Janos Veress,[5] developed a new needle for the creation of pneumothorax in patients with tuberculosis. Laparoscopists quickly realized the potential of using the needle in creating pneumoperitoneum with minimal risk of injuring intraabdominal organs. The Veress needle has become the standard laparoscopic instrument ever since.

After World War II, the discovery of the rod-lens system by Harold Hopkins and the cold light by Karl Stortz revolutionized laparoscopic imaging, and finally the laparoscopist could see clear and color-true images. More importantly, the risk of thermal injuries to the abdominal organs by incandescent light was eliminated. Raoul Palmer,[6] the French gynecologist, changed the approach from the upper to the lower abdomen, placed his patient into the Trendelenburg position, and stressed the importance of keeping the intraabdominal pressure below 25 mm Hg. These developments as well as the political environment in the years of assertion of women's rights prompted explosive use of laparoscopy in gynecologic procedures. The enthusiasm about laparoscopic surgery in the United States helped the formation of the American Association of Gynecologic Laparoscopists in 1972 by Jordan Philips, Richard Soderstrom, Jacque Rioux, Philip Brooks, Frank Loffer, and others.

The early 60s and 70s witnessed periods of doubt, transition, and again progress in laparoscopy. The first reports of very low complication rates were challenged when the wider use of the new technique led to a higher incidence of adverse consequences. In Germany, laparoscopic procedures were temporarily banned. One of the strongest advocates in the laparoscopic movement was the German gynecologist Kurt Semm.[7] He provided improvements in instrumentation, including an automatic insufflation apparatus, endocoagulation, a tissue morcellator, a suction-irrigation system, and many others. His absolute dedication to laparoscopy and teaching led him to invent the Pelvi-trainer, which allowed all of us to gain experience in laparoscopic surgery. In 1982, he performed the first laparoscopic appendectomy. He was unable to report about his surgical breakthrough in the hostile environment within the community of general surgeons in Germany. Semm used his administrative position at his institution to fight skepticism and to promote laparoscopic surgery as a method of lessening pain and trauma in infertility patients. He was forced to avoid using the name laparoscopy and revert to using the name pelviscopy.[7]

In North America, one of this year's honorary chairs, Victor Gomel,[8] reported good results with infertility patients undergoing corrective laparoscopic surgery.

Despite the advancements in laparoscopic methods, the primary difficulty with laparoscopy in the 1980s remained visualization. The laparoscope was only 10-mm wide, and the observation of the internal peritoneal organs was limited to the operating surgeon, who was further constrained by having to operate in a difficult, hunched over position. In the early and mid-80s, the German surgeon, Erich Muhe, used his Galloscope featuring a laparoscopic opening of 30 mm and improved circular illumination and performed the first laparoscopic cholecystectomy in 1985. Muhe himself called the procedure "magic." Like Bozzini 180 years earlier, Muhe was denied recognition for his achievement. Only in retrospect, in 1991, did he receive credit for 94 laparoscopic cholecystectomies performed in 2 years. Harry Hassan introduced the technique of open laparoscopy[9] and Frank Lofer contributed to safe abdominal entry.

A turning point in operative endoscopy was the development of videolaparoscopy. Camran Nezhat,[9-11] in the forefront of the discovery of videolaparoscopy, operated off the monitor in the late 1970s and early 1980s. He used very heavy and awkward video cameras, produced for other uses, which he customized for use with the laparoscope **(Figure 1)**. Operating directly from the visual field

turned the original laparoscopic surgery of a one-man band into an orchestra, including assisting surgeons, nurses, and others. At the beginning, Nezhat was faced with severe criticism for advocating operating off the video monitor and the technique was labeled "dangerous" and a technique that only "one out of a hundred" might be able to perform. Acceptance of novel methods and ideas has encountered difficulties for centuries. Despite skepticism, Camran Nezhat continued his efforts. The entry road for laparoscopic use in general surgery was opened widely with the possibility of operating off the video monitor, as expressed by Tadir.[9-11]

Nezhat went further and demonstrated that even the most advanced stages of endometriosis could be successfully treated by videolaparoscopy.[11] He said, "If advanced stages of endometriosis can be successfully treated by videolaparoscopy, with the results at least as good as [those of] laparotomy, we can perform practically all the surgical procedures by videolaparoscopy."

In his opinion, videolaparoscopy is the method of choice for an operation whenever a cavity exists in the body or when a cavity can be created. He and his associates went on to perform some of the most difficult abdominal surgeries laparoscopically with excellent results.[9-11] Like Bozzini, Semm, Muhe, and others, Nezhat too was subjected to undue criticism. His efforts in achieving progress, innovation, and excellence in advanced operative endoscopy were met with hostility and suspiciousness by a few individual physicians, unfamiliar with this technique, and by some laparoscopists with a misguided sense of competitive spirit. Similar to the experience of other innovators, Nezhat encountered attacks on his judgment, integrity, and skills. This environment of extreme skepticism led to a formal investigation of his work by an independent "blue ribbon" committee. After an extensive investigation entailing interviews with hundreds of nurses, physicians, patients, and administrators, Camran Nezhat's work, and that of his colleagues, was found to be categorically free of any misconduct.

The technique of videolaparoscopy popularized laparoscopic cholecystectomy around the world. One hundred years after the first open cholecystectomy, Philippe Mouret performed the first laparoscopic cholecystectomy in 1987. The 1990s witnessed wide acceptance of laparoscopic surgery. In 1992, an NIH conference declared that laparoscopic cholecystectomy should be the operation of choice for uncomplicated cholelithiasis. Many members, founders, board members, and past presidents of the Society of Laparoendoscopic Surgeons (SLS) are early pioneers in advanced operative videolaparoscopy. They are responsible leaders for advancing the art and science of operative laparoscopy.

The international popularization of laparoscopic surgery helped develop scientific exchange in the field. This raised the need for organized communication among those who were experts in their field and those who wanted to enter laparoscopic surgery. In addition, the need for an administrative authority to handle the controversies in laparoscopic development and the standardization of the practice of laparoscopy lead the visionary Paul Wetter and some of his colleagues to establish the Society for Laparoendoscopic Surgeons in 1990. Physicians from various specialties formed a community, which helped accelerate the introduction of endoscopic procedures in the field of urology, gynecology, and general surgery. The society encouraged a multidisciplinary approach to the development of new ways to apply endoscopic techniques through exchange of information and hands-on, high-quality formal education. SLS has successfully organized annual meetings for the past 10 years and has sponsored 30 postgraduate courses. Our society promoted scientific research in the area of laparoscopic surgery and facilitated its publication in *JSLS, Journal of the Society of Laparoendoscopic Surgeons*, under the direction of its capable editor Michael Kavic. The Society has made an effort to promote excellence and to recognize and honor individuals with outstanding contributions to laparoscopy through the prestigious Excel Award.

Dear Colleagues, the future of our field is bright, as we stand on the strong shoulders of the giant forefathers of laparoscopy. Knowledge of the past provides the building stones of the future, but it is up to us to create a mon-

ument. We carry the responsibility for the future success of the field, and I would like to share with you a few issues in that regard.

Our society brings together professionals with a broad spectrum of surgical training. The presence of diverse skills should undoubtedly foster innovation in surgical technology as progress is made faster and easier and as collaboration between different disciplines improves. Such innovations should include the development of safer, easy to use, and state-of-the-art instrumentation for laparoscopic procedures. Current developments in surgical robotics represent only the initial attempts to simplify complex laparoscopic procedures, providing precision in dexterity and perfection of repetitious tasks like suturing. Integration of robotic, advanced computer technology, and videolaparoscopy has led to successful implementation of telesurgery, enabling the use of laparoscopy in remote locations.

The road to technological progress always encounters funding difficulties, and the development of laparoscopy is not an exception. The effective liaison between industry and medical professionals should beneficially influence the expense associated with the development of laparoscopic technology. SLS may choose to take steps to facilitate such cooperation. Our goal should be to foster innovation intellectually and financially. However, the essential task in all aspects of the innovative process remains an educational task.

There has to be a program in education by precept, by education, and by experience. There should be a set of quantitative measures for education with the aim to establish a standard. Laparoscopy is a unique surgical skill requiring specific training for spatial localization and safe manipulation of surgical instruments in the abdominal and chest cavities. The standard training should begin in medical school and residency, with an initial period of intensive didactic learning including laboratory exercises, followed by a period of hands-on experience under strict preceptorship. Well-trained laparoscopic surgeons with extensive experience are essential to high-quality patient care and risk reduction. Improper training leads to complications and lack of appropriate judgment and surgical mishaps in laparoscopic management, triggering increased litigation and the development of a special breed of laparoscopic experts in the new millennium called the medical expert witness. The contribution of these medical expert witnesses to the field of laparoscopy is that of the continuing exodus of talented endoscopists to other disciplines. Only educational efforts will lead to prevention, timely recognition, and expert intervention of complications associated with laparoscopic treatment. Solid and continuing education of those who follow our steps, along with cost-effective, widely available instrumentation will broaden the application of our powerful tool and help establish laparoscopy as a primary surgical technique in every operating room around the world.

In particular, laparoscopy should become the method of choice not only for benign conditions, but also for the treatment of certain malignant solid organs when applicable. With rapid postoperative recovery and shorter hospitalization, reduced pain, faster return of bowel function, fewer wound problems, less adhesion formation, and earlier possibility for chemo- and radiation therapy, laparoscopy is assuming a role in diagnosis, staging, and treatment of cancer. Defining the role of laparoscopy in cancer treatment is complex. It is clear that with improvement in surgical skills and instrumentation, the areas once thought to be inaccessible to the laparoscopic approach are now tackled with success. It seems the issue is not whether the cancer operation is feasible laparoscopically, but rather the presence of consensus regarding indications. To truthfully explore the power of our new technology, we must adhere to scientific principles. The role of laparoscopic surgery in cancer treatment should be assessed in carefully designed studies, including 5-year survival rates and comparison with the results of open surgery. Ultimately, we would like to confirm what most of us believe: not only is the laparoscopic approach to malignancy technically possible, it may be advantageous to the patient.

In conclusion, although we may encounter roadblocks on our way, in the spirit of Francis Bacon, the fundamentals of our society should focus on cooperation by unifying ideas for a common goal, teamwork, and creative economic service. The Society should serve to protect its members and should acquire enough political power to provide such protection. Most importantly, we should concentrate on education. There is no nobler task for us as a society than teaching younger colleagues and providing them with the skills and knowledge to advance and use minimally invasive methods to benefit patients and society.

I would like to thank you for the privilege of addressing you today. I am grateful, indeed, to all of my friends, colleagues, and society members for guiding my involvement this year, and to all SLS staff for their tireless efforts

in the organizational tasks. I thank especially Dr. Paul Wetter and Janis Chinnock for their endless unconditional support and their dear friendship. My words of highest honor and appreciation are dedicated to my mentors. First, Dr. Camran Nezhat, it has been an honor and a privilege to be his brother. Since childhood, he has been my mentor in life, education, and especially in the pursuit of medicine. Working with him has brought challenge, excitement, and the sense of achievement. Second, my honor goes to my friend and teacher, Dr. Carmel Cohen, who helped shape and refine my skills in the field of gynecologic oncology by unselfishly sharing his knowledge and wisdom. His influence will be everlasting. Last, but not least, I am indebted to the lifelong support I have received from my family, especially my younger brother Dr. Ceana Nezhat, for his self-less devotion, contribution, dedication, and love. I thank you all for working endless hours with perseverance and enthusiasm, for teaching the lessons of patience, modesty, and joy of creation.

This address I dedicate to my mother, who left us suddenly last year due to pancreatic cancer. She will forever be in my heart. God bless her soul.

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