

Nezhat’s Textbook of Minimally Invasive Surgery

Nezhat's Textbook of Minimally Invasive Surgery

Including Hysteroscopy, Vaginoscopy
and Robotic-Assisted Procedures

Fifth edition

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Dedicated to our patients, our students, our friends, our colleagues, our staff, and of course our families for their confidence, guidance, encouragement, and loyalty.

Contents

<i>List of Online Resources</i>	x
<i>List of Contributors</i>	xii
<i>Foreword Alan DeCherney MD</i>	xix
<i>Preface</i>	xxi
1	A History of Modern-Day Video Surgery with and without Robotic Assistance 1 Barbara Page, Nataliya Vang, and Angie Tsuei
2	Equipment for Operative Laparoscopy and Hysteroscopy 26 2.1 The Role of Medical Equipment in Healthcare's Evolution 26 Ali Amiri 2.2 Laparoscopic Equipment and Operating Room Setup 32 Shruti Agarwal, Elizabeth Buescher, Erica Schipper, and Camran Nezhat
3	Anesthesia 47 Pedro P. Tanaka, Robert T. Arrigo, Arjun Desai, and John H. Nguyen
4	Patient Positioning and Operating Room Setup 52 Ashley Bartalot and Farr Nezhat
5	Laparoscopic Access 59 5.1 Safe Laparoscopic Access 59 Louise P. King, Atena Asiaii, Nataliya Vang, Ceana Nezhat, Azadeh Nezhat, Ibrahim Alkatout, Liselotte Mettler, Roger Ferland, and Farr Nezhat 5.2 LapCap2: Abdominal Access Safety Device 73 Camran Nezhat, Nataliya Vang, and Azadeh Nezhat
6	Laparoscopic Suturing 75 6.1 Video Laparoscopic Suturing: Pasic's Perspective 75 Joseph L. Hudgens, Resad Pasic, and Megan Kennedy Burns 6.2 New Suturing Techniques: Barbed Sutures 84 Jon I. Einarsson and Sarah L. Cohen Rassier 6.3 Advanced, Stylistic Video Laparoscopic Suturing 88 Deborah Lee, Akira Shirane, and Shanti Mohling
7	Pelvic Anatomy 102 7.1 Intraperitoneal and Retroperitoneal Anatomy 102 Marcello Ceccaroni, Roberto Clarizia, Daniele Mautone, and Giovanni Roviglione 7.2 The New Space 118 Robert Roman, Anupama Rambhatla, Atena Asiaii, Lovely Jethwani, and Catarina Miranda-Silva
8	Hysteroscopy 122 8.1 Diagnostic and Operative Hysteroscopy 122 Sara McKinney and Louise P. King 8.2 Evaluation and Management of the Uterine Septum 139 Jovana Tavcar, Kelly N. Wright, and Keith Isaacson 8.3 Intrauterine Adhesions: Hysteroscopic Evaluation and Treatment 149 Rafael F. Valle, edited by Keith Isaacson and Lydia Garcia 8.4 Video Hysteroscopic Tubal Cannulation 155 Tommaso Falcone and Jeffrey M. Goldberg
9	Fertility 159 9.1 Frontiers in Fertility 159 Kutluk Oktay and Giuliano Bedoschi 9.2 Assessment of the Endometrial Cavity in the Patient with Infertility 171 Steven R. Lindheim, Yao Lu, Yun Sun, Mindy Christianson, and Artur Ludwin 9.3 Ultrasound Oocyte Recovery 192 Ebru Ozturk, Leo Doherty, and Aydin Arici 9.4 Ultrasonography and the Embryo Transfer 196 Eric Flisser, Jamie A. Grifo, and Sina Sadeghzadeh 9.5 Salpingectomy and Salpingostomy 214 Neil Johnson 9.6 Cesarean Scar Defect: Niche, Uteroperitoneal Fistula, Isthmocele 218 Camran Nezhat, Nataliya Vang, Mailinh Vu, and Azadeh Nezhat
10	Management of Adnexal Masses 224 10.1 The Adnexal Mass 224 Mahkam Tavallae, Tanja Pejovic, Louise P. King, Michael Lewis, Erica Schipper, Cihat Unlu, Gazi Yildirim, Jennifer Cho, Camran Nezhat, and Farr Nezhat 10.2 Management of the Ectopic Pregnancy 243 Bulut Varli and Bulent Berker 10.3 Management of Tubo-Ovarian Abscesses 258 John F. Steege, Pavan K. Ananth, and Ceana H. Nezhat

10.4	Robotic Management of Inflammatory Bowel Diseases	266	15.2	Laparoscopic Hysterectomy with and without Robotic Assistance: Stanford Experience	447
	Leslie S. Anewenah, Erin King-Mullins, and Wayne L. Ambroze			Camran Nezhat, Ofer Lavie, Madeleine Lemyre, Ofer Gerner, Lisa Bhagan, and Ceana Nezhat	
10.5	Surgical Treatment of Polycystic Ovary Syndrome	276	15.3	VL Excision of a Rudimentary Uterine Horn	450
	Mausumi Das and Togas Tulandi			Togas Tulandi	
10.6	Ovarian Remnant Syndrome	280	15.4	Uterine Transplant: A Brief History and Current Perspectives	453
	George A. Vilos, Jennifer Marks, and Basim Abu-Rafea			Rebecca Flyckt and Tommaso Falcone	
11	Endometriosis	284	16	Pelvic Floor Procedures	460
11.1	The Pathogenesis of Endometriosis	284	16.1	Minimally Invasive Surgical Approaches for the Treatment of Urinary Incontinence	460
	Richard O. Burney and Linda C. Giudice			Vincent R. Lucente, Cristina Saiz, Andrea Pezzella, and Jessica Sosa-Stanley	
11.2	Video Laparoscopic (VL) Management of Endometriosis with and without Robotic Assistance (VLRA)	292	16.2	Technique of Transvaginal Mesh and Biologic Graft Placement	474
	Camran Nezhat, Elizabeth Buescher, Chandhu Paka, Ceana Nezhat, and Farr Nezhat, updated by Nisha Lakhi and Gabrielle Tricorico			Vincent R. Lucente, Cristina Saiz, Andrea Pezzella, and Jessica Sosa-Stanley	
11.3	Genitourinary Endometriosis	337	16.3	Laparoscopic Vaginal Vault Suspension	480
	Megan Kennedy Burns, Michelle A. Wood, and Camran Nezhat			Peter S. Finamore and Bogdan Grigorescu	
11.4	Robotic-Assisted Laparoscopic Surgery for Deeply Infiltrating Endometriosis	341	16.4	Laparoscopic Repair of Cystourethrocele and Vaginal Vault Prolapse	493
	Farr Nezhat and Nisha Lakhi			Cihan Kabukcu and Bulent Berker	
11.5	Minimally Invasive Treatment of Chronic Pelvic Pain	350	16.5	Video Laparoscopic Paravaginal Defect Repair	497
	Radu Apostol			Shazia Malik	
12	Video Laparoscopic Adhesiolysis and Adhesion Prevention	358	16.6	Video Laparoscopic Repair and Robotic-Assisted Laparoscopic Repair of Vesicovaginal Fistula	498
	Danielle Luciano and Anthony Luciano			Hélder Ferreira, Andrés Vigueras Smith, Arnaud Wattiez, Azadeh Nezhat, and Pengfei Wang	
13	Video Laparoscopic Sterilization	363	16.7	Rectovaginal Fistula Repair: The Management of Intestinal Fistula	507
	Radha Syed, Erica Schipper, Adrienne Ligouri, Gabrielle Tricorico, and Nisha Lakhi			Nalini Raju and Ceana Nezhat	
14	Leiomyomas	369	16.8	Video Laparoscopically Assisted Neovaginoplasty	511
14.1	The Minimally Invasive Management of Leiomyomas	369		Sara Yvonne Brucker, Katharina Rall, and Diethelm Wallwiener	
	M. Shoma Datta-Thomas		17	Video Laparoscopy	518
14.2	Uterine Fibroid Embolization	386	17.1	Video Laparoscopy with Robotic Assistance (VLRA) Presacral Neurectomy	518
	Crystal Razavi and Mahmood K. Razavi			Ceana Nezhat and Vadim Morozov	
14.3	Robotic-Assisted Myomectomy	390	17.2	Video Laparoscopic Uterosacral Transection and Ablation	524
	Antonio R. Gargiulo and Serene S. Srouji			Centini Gabriele, Luca Labanca, Fulvio Zullo, and Errico Zupi	
14.4	Tissue Extraction Techniques during Minimally Invasive Surgery	402	18	Gynecologic Malignancy	529
	Kimberly A. Kho and Anne Porter		18.1	Minimally Invasive Management of Gynecologic Malignancy	529
14.5	Minimally Invasive Management of Adenomyosis	408		Jennifer E. Cho and Farr Nezhat	
	Hisao Osada, Toshiyuki Kakinuma, Sherman J. Silber, Michael DeRosa, and Keiichi Kato		18.2	Laparoscopic and Robotic Pelvic/Para-aortic Lymphadenectomy	531
14.6	Uterine Adenomyosis: Video Laparoscopic Management	414		Burak Zeybek, Masoud Azodi, and Gulden Menderes	
	George A. Pistofidis, Ourania G. Koukoura, and Elizabeth Buescher		18.3	Video Laparoscopy and Robotics for Endometrial Cancer	546
15	Hysterectomy	428		Evan S. Smith and Mario M. Leitao	
15.1	Hysterectomy: Indications, Techniques, and Outcomes	428			
	Pavan Ananth, Adi Katz, and Harry Reich				

18.4	Video Laparoscopic and Robotic Radical Hysterectomy and Trachelectomy	557	22.2	Intraoperative Sigmoidoscopy in Gynecologic Surgery	736
	Yukio Sonoda and Nadeem R. Abu-Rustum			Maria A. Hincapie, Dina Abdelsamad, and Ceana Nezhat	
18.5	Robotic-Assisted Radical Hysterectomy and Trachelectomy	572	22.3	Appendectomy	742
	Farr Nezhat, Anthony Marco Corbo, and Nisha Lakhi			Bulut Varli and Bulent Berker	
18.6	Minimally Invasive Surgery for Ovarian, Fallopian Tube, and Primary Peritoneal Cancer	591	22.4	Video Laparoscopy with Robotic Assistance for Tubal Anastomosis	751
	Farr Nezhat, Gerald Feuer, Nisha Lakhi, Vanessa Martinelli, and Sangeeta Ramani			Melinda B. Henne	
18.7	Single-Port Surgery for Gynecologic Oncology	623	23	Simulation Training in Minimally Invasive Surgery	759
	Nisha A. Lakhi, Lori Weinberg, and Pedro F. Escobar			Gabrielle Tricorico, Jane M. Ponterio, and Nisha Lakhi	
18.8	Hysteroscopy and Endometrial Cancer	631	24	Robotic-Assisted Laparoscopy	767
	Pavan K. Ananth, William H. Bradley, Justin A. Harold, and Ceana H. Nezhat		24.1	A History of Telepresence Surgery	767
18.9	Second-Look Surgery for Gynecologic Malignancy	639		Ajit Shah and Erica Schipper	
	Sharyn N. Lewin and Thomas J. Herzog		24.2	Computer-Assisted Surgery and Surgical Robotics	772
18.10	Port-Site Metastasis and Pneumoperitoneum	647		Julia M. Chandler, Stephanie D. Chao, and Thomas M. Krummel	
	Chandrakanth Are, Silvana Pedra Nobre, and Nadeem R. Abu-Rustum		24.3	Universal Telesurgery	777
18.11	Indications of Cytoreductive Surgery (CRS) and Hyperthermic Intraperitoneal Chemotherapy (HIPEC) for Peritoneal Carcinomatosis in Patients with Ovarian Cancer	658		Ceana Nezhat	
	Thomas Boerner and Oliver Zivanovic		25	Vascular Surgery and Management of Pelvic Complications	782
18.12	Endometriosis and Endometriosis-Associated Ovarian Cancer (EAOC)	662	25.1	Minimally Invasive Vascular Surgery	782
	Tanja Pejovic, Sarah Thisted, Michael White, and Farr R. Nezhat			Tomi Kanninen, Nandita N Mahajan, and Nisha Lakhi	
18.13	Hereditary Ovarian and Endometrial Cancer	669	25.2	Genitourinary Tract Injury during Video Laparoscopic Surgery	795
	Sushmita Gordhandas, Emeline M. Aviki, and Kara Long Roche			R. Wendel Naumann and Kevin J. E. Stepp	
18.14	Techniques of Minimally Invasive Surgery for Gastrocolic and Infracolic Omentectomy	679	25.3	Gastrointestinal Tract Injury during Laparoscopic Surgery	799
	Gerald Feuer, Nisha Lakhi, and Farr Nezhat			Shushmita M. Ahmed and John M. Morton	
19	Video Laparoscopic Surgery during Pregnancy	689	26	Fetal Surgery	808
	Megan Kennedy Burns, Stacy Young, Michelle A. Wood, Nisha Lakhi, Kimsa Nguyen, Kelly Robinson, and Ceana Nezhat		26.1	Fetal Therapy	808
20	Pediatric Surgery	703		Michael V. Zaretsky	
20.1	Minimal Access Pediatric Surgery	703	26.2	New Developments and Directions in Fetoscopic Surgery	820
	Enrico Danzer and Matias Bruzoni			Nisha Lakhi and Michael Moretti	
20.2	Minimally Invasive Surgery in Pediatrics	709	27	Hemostatic Agents in Minimally Invasive Surgery	831
	Rebecca Falik, Monika Oktaba, Carolyn Kay, Anna Nidhiry, Azadeh Nezhat, and Camran Nezhat			Leandro Fusaro, Pavan Ananth, and Ceana Nezhat	
21	Video Laparoscopic Aortic Surgery	720	28	New Techniques in Minimally Invasive Surgery	839
	Jean Picquet, Oscar J. Abilez, Jérôme Cau, Christopher K. Zarins, and Olivier Goëau-Brissonnière			Ido Sirota and Thomas M. Krummel	
22	Additional Procedures for Pelvic Surgeons	725			
22.1	Cystoscopy	725			
	Ceana Nezhat and Mohamed Elghitany				

Appendix 1: Medical Equipment Images	847
Appendix 2: Image Atlas	851
Index	860

Online Resources

Articles and video available to download at www.cambridge.org/nezhat-5

5 Laparoscopic Access	
Preoperative Periumbilical Ultrasound-Guided Saline Infusion (PUGSI) as a Tool in Predicting Obliterating Subumbilical Adhesions in Laparoscopy	Ceana Nezhat, Jennifer Cho, Vadim Morozov, and Patrick Yeung Jr.
9 Fertility	
Opportunistic Salpingectomy: An Appropriate Procedure during All Pelvic Surgeries	Farr R. Nezhat and Vanessa T. Martinelli
Cesarean Scar Defect: What Is It and How Should It Be Treated?	Camran Nezhat, Lindsey Grace, Rose Soliemannjad, Gity Meshkat Razavi, and Azadeh Nezhat
Surgical Management of Niche, Isthmocele, Uteroperitoneal Fistula, or Cesarean Scar Defect: A Critical Rebirth in the Medical Literature	Camran Nezhat, Rebecca Falik, and Anjie Li
Outcomes of Laparoscopic Cesarean Scar Defect Repair: Retrospective and Observational Study	Camran Nezhat, Benjamin Zaghi, Kelly Baek, Azadeh Nezhat, Farr Nezhat, Steven Lindheim, and Ceana Nezhat
11 Endometriosis	
11.12 – video	
Thoracic Endometriosis Syndrome: A Review of Diagnosis and Management	Camran Nezhat, Steven R. Lindheim, Leah Backhus, Mailinh Vu, Nataliya Vang, Azadeh Nezhat, and Ceana Nezhat
Endometriosis: Ancient Disease, Ancient Treatments	Camran Nezhat, Farr Nezhat, and Ceana Nezhat
Role of Laparoscopic Treatment of Endometriosis in Patients with Failed In-Vitro Fertilization Cycles	Eva Littman, Linda Giudice, Ruth Lathi, Bulent Berker, Amin Milki, and Camran Nezhat
Pathophysiology and Management of Urinary Tract Endometriosis	Camran Nezhat, Rebecca Falik, Sara McKinney, and Louise P. King
Bowel Endometriosis Diagnosis and Management	Camran Nezhat, Anjie Li, Rebecca Falik, Daniel Copeland, Gity Razavi, Alexandra Shakib, Catalina Mihailide, Holden Bamford, Lucia DiFrancesco, Salli Tazuke, Pejman Ghanouni, Homero Rivas, Azadeh Nezhat, Ceana Nezhat, and Farr Nezhat
Endometriomas: Classification and Surgical Management	Rebecca C. Falik, Anjie Li, Frances Farrimond, Gity Meshkat Razavi, Ceana Nezhat, and Farr Nezhat
Optimal Management of Endometriosis and Pain	Camran Nezhat, Nataliya Vang, Pedro P. Tanaka, and Ceana Nezhat
Pathophysiology and Clinical Implications of Ovarian Endometriomas	Farr R. Nezhat, Ann M. Cathcart, Ceana H. Nezhat, and Camran R. Nezhat

(cont.)

The Prevalence of Endometriosis in Patients with Unexplained Infertility	Camran Nezhat, Farrah Khoyloo, Angie Tsuei, Ellie Armani, Barbara Page, Thomas Rduch, and Ceana Nezhat
Use of the Free Endometriosis Risk Advisor App as a Non-Invasive Screening Test for Endometriosis in Patients with Chronic Pelvic Pain and/or Unexplained Infertility	Camran Nezhat, Ellie Armani, Hsuan-Chih Carolina Chen, Zahra Najmi, Steven R. Lindheim, and Ceana Nezhat
14 Leiomyomas	
Strong Association between Leiomyoma and Endometriosis	Camran Nezhat, Anjie Li, Sozdar Abed, Erika Balassiano, Rose Soliemannjad, Azadeh Nezhat, Ceana H. Nezhat, and Farr Nezhat
A Patient with Severe Adenomyosis Requests Uterine-Sparing Surgery	Camran Nezhat, Michelle A. Wood, Megan Kennedy Burns, and Azadeh Nezhat
15 Hysterectomy	
Vaginal Cuff Dehiscence and Evisceration: A Review	Camran Nezhat, Megan Kennedy Burns, Michelle Wood, Ceana Nezhat, Azadeh Nezhat, and Farr Nezhat
Reverse Vesicouterine Fold Dissection for Lap Hysterectomy after Prior Cesarean Deliveries	Camran Nezhat, Lindsey A. Grace, Gity M. Razavi, Catalina Mihailide, and Holden Bamford
Hysterectomy in Patients with History of Prior Cesarean Delivery: A Reverse Dissection Technique for Vesicouterine Adhesions	Camran Nezhat, Mailinh Vu, Nataliya Vang, Edzhem Tombash, and Azadeh Nezhat
18 Gynecologic Malignancy	
New Insights in the Pathophysiology of Ovarian Cancer and Implications for Screening and Prevention	Farr R. Nezhat, Radu Apostol, Camran Nezhat, and Tanja Pejovic
25 Complications in Laparoscopy	
Genitourinary Endometriosis: Diagnosis and Management	Megan Kennedy Burns, Michelle A. Wood, Camran Nezhat, and Farr Nezhat
Modern Surgical Techniques for Gastrointestinal Endometriosis	Camran Nezhat, Megan Kennedy Burns, Michelle A. Wood, and Ceana Nezhat

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Foreword

It is a privilege to endorse the fifth edition of this seminal book on minimally invasive surgery, authored by the distinguished Nezhat family. Widely recognized as pioneers in this field, the Nezhat's contributions have revolutionized surgical practices and inspired a generation of surgeons to push the boundaries of innovation and patient care. This latest edition is a beacon of knowledge, skill, and dedication, offering an unparalleled resource for practitioners, students, and researchers alike.

The structure of the book is meticulously designed to guide readers through the multifaceted world of minimally invasive surgery. It begins with a historical perspective on the development of this field. Here, the authors shed light on the groundbreaking discoveries, techniques, and technologies that have shaped minimally invasive surgery into what it is today. This section not only honors the legacy of the field but also offers invaluable lessons for its continued advancement.

The second section of the book focuses on disease entities, with endometriosis as the centerpiece. This condition, which has long challenged surgeons because of its complexity and impact on patients' quality of life, is explored in depth. The authors provide unparalleled insight into the surgical management of endometriosis, offering strategies and techniques that reflect decades of expertise. In addition to endometriosis, this section highlights the surgical management of various other diseases, including fibroids and infertility, broadening the

scope and applicability of the knowledge presented. The detailed discussions in this section underscore the critical role of minimally invasive approaches in addressing a wide range of conditions with precision and efficacy.

The final portion of the book is dedicated to innovation and future advances. In this forward-looking section, the authors explore groundbreaking developments such as enhanced video technologies that improve surgical visualization and robotic applications. Fetal surgery and surgical treatment of malignancy are comprehensively discussed. The authors also discuss research ideas and emerging trends that will shape the future of minimally invasive surgery. This section serves as an inspiring call to action for readers, encouraging them to contribute to the ongoing evolution of the field.

The book is beautifully illustrated, allowing readers in many cases to see step-by-step details of surgical practice.

The Nezhat's have put together a team of contributors who constitute a Who's Who of minimally invasive surgery.

This fifth edition of *Nezhat's Textbook of Minimally Invasive Surgery* is a classic, a source of invaluable information for all levels of readers, both learners and practitioners.

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Preface

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Dr. Camran Nezhat and Dr. Azadeh Nezhat with student, fellows, and international physicians.

The first successful vertical laparotomy was performed in the early eighteenth century by Ephraim McDowell and was initially negatively received by authorities in the medical community. Dr. James Johnson, the editor of the *Medico-Chirurgical Review* of London, in 1817 wrote, “In spite of all that has been written respecting this cruel operation, we entirely disbelieve that it has been performed with success, nor do we think that it ever will.” Over a decade later, Dr. Johnson issued an apology: “A back settlement of America – Kentucky, has beaten the mother country, nay, Europe itself, with all the boasted surgeons thereof, in the fearful and formidable operation of gastronomy with extraction of diseased ovaria There were circumstances in the narrative of some of the first three cases, that raised misgivings in our minds, for which uncharitableness we ask pardon of God and Dr. McDowell of Danville.” One hundred years after McDowell’s success, Hermann Johannes Pfannenstiel performed the first transverse laparotomy. It took another one hundred years for data to be

published confirming that Pfannenstiel’s transverse laparotomy had lower complication rates than the traditional vertical approach.[1]

A similar progression has been seen with developments in laparoscopy. The first endoscopy was done in the eighteenth century by Philipp Bozzini, who developed the Lichleiter instrument to look inside the bladder. It was not accepted initially. One hundred years later, George Kelling performed the first laparoscopy in the early nineteenth century.[2,3] Many virtuosos, such as Hans Christian Jacobeous, Raoul Palmer, and Kurt Semm, used laparoscopy throughout the 1900s to perform intraperitoneal biopsies, lysis of adhesions, and other simple procedures, but no advances were made in the field and the adoption of this technique was not accepted worldwide.[2,3,4] Since we invented and pioneered video laparoscopy (video surgery) and demonstrated that it is more effective in treating pathology than laparotomy, modern-day operations have been revolutionized.[2,3,5–15] We have seen



Dr. Camran Nezhat, Dr. Farr Nezhat, and Dr. Ceana Nezhat with students and staff.

that the utility of video surgery has expanded such that it is now routinely used for the surgical management of even the most advanced pathology. As we initially predicted, there is now ample evidence to show that operative laparoscopy (video laparoscopy/video surgery) is the preferred surgical method when a body cavity exists or can be created.[5–10] Video surgery allows for better visualization of the operative field, turning macroscopic surgery into microsurgery. Among its other advantages, the anatomy is magnified and visualization is improved, which facilitates the operative procedures and leads to better results. The limiting factors are the skill and experience of the surgeon and the availability of proper instrumentation. [5–7]

In the 1980s and 1990s, we had significant difficulty publishing our work in the medical literature and almost all of our video laparoscopy papers were rejected. However, our patients advocated for the use of our video surgical methods, and they described their experiences in widely read magazines such as *Time* and *Newsweek* in the mid-1980s.[11–13] Hence, the acceptance of minimally invasive surgery was initially driven by the patients. Since the medical establishment was resistant, and would not publish our opinions, new techniques, or outcome data, we welcomed the public and the media's interest in our work. Based upon patient enthusiasm, we stated in a 1990s *Newsweek* article that "In twenty years, laparotomy will be extinct." [11–14] However, our enthusiasm was quickly tempered since many well-respected medical authorities did not like the positive public attention to our work, so they called video surgery and minimally invasive surgery a "gimmick" or "a bursting bubble." [16–19] When we submitted a paper describing video laparoscopy, it was rejected because "operating on the monitor and not looking through the scope while

doing surgery is dangerous and only one out of 200 surgeons are capable of doing this and that we were advocating a dangerous technique." Some authorities in colorectal surgery called laparoscopic bowel resection barbaric. Opposition toward minimally invasive surgery came from all angles. The Federal Bureau of Investigation, the Internal Revenue Service, the Justice Department, and multiple state medical boards were all investigating us at the same time, possibly because they had received accusations against us that we were "gangster surgeons or medical terrorists." [10,19] All this occurred because we invented and developed video surgery (modern-day minimally invasive surgery), were performing the most difficult operations, and producing better results. This was a very threatening development for the medical establishment. Perhaps many were well intentioned and believed they were protecting surgical traditions. However, they could not envision the impact video surgery would have on the field. When all was said and done, we withstood the accusations of barbarism, commercialism, medical terrorism, and even a surprising Stanford "suspension-ism" to be reversed by an apology and several months later by our reinstatement. [10,20] In the end, we (and video surgery) were exonerated by respected medical authorities from all of these smear campaigns, which produced a victory for patients all over the world. [6,10]

It was not until the 1990s, when general surgeons began to perform cholecystectomies via video laparoscopy, that it was viewed as a legitimate alternative to open surgery. [2,3,21] There is now overwhelming evidence that video laparoscopy is superior to laparotomy. For example, although obesity was previously thought to be a contraindication for the use of video laparoscopy, it has now become the preferred method (over laparotomy) for obese patients. [22] Another misconception

about video laparoscopy was that it would be very expensive. In contrast, multiple Cochrane reviews show that video laparoscopy actually costs less than laparotomy because less money is spent on hospitalization and postoperative pain management, there are fewer complications, and patients experience fewer missed work days.[23] In 2004, a *New England Journal of Medicine* editorial described the overall benefits of video laparoscopy, particularly for bowel resections. This is the same procedure that was called barbaric when it was first presented in 1988.[5,6,24–26] The editor of the *New England Journal of Medicine* wrote, “Surgeons must progress beyond the traditional techniques of cutting and sewing . . . to a future in which . . . minimal access to the abdominal cavity [is] only the beginning.”[27] To his credit, the former editor of *Obstetrics and Gynecology* (the official journal of the American College of Obstetricians and Gynecologists), who was one of the original naysayers, acknowledged in 2010 that “A substantial body of evidence has accumulated in recent years to support the laparoscopic approach to various gynecologic operations.”[28]

The robotic-arm has been another enabling component that has led to the increased use of video laparoscopy,[29] which has allowed more surgeons to become proficient in minimally invasive surgery (MIS) (Figure 1). Despite the increased approval that video surgery (video laparoscopy/MIS) has received, most surgical procedures are still approached via laparotomy. Gynecologic oncologists have adapted video laparoscopy with and without robotic assistance in the management of cervical, ovarian, fallopian tube, and endometrial cancers, which has optimized patient outcomes. Recently, a randomized controlled trial was performed to evaluate laparotomy versus video laparoscopy with and without robotic assistance for the management of radical hysterectomy in stages IA1, IA2, and IB cervical cancers. This study found that MIS was associated with lower rates of disease-free survival and overall survival when compared to laparotomy.[30] Unfortunately, more centers are beginning to change their surgical method based on this study, and more patients are undergoing laparotomy. However, this study was likely biased since certain surgical centers with low volume and less experience were noted to have lower overall survival. This calls into

question the surgeon’s skill level and proper patient selection rather than the laparoscopic technique utilized. Having performed the first laparoscopic radical hysterectomy para-aortic and pelvic node dissection for low stage cervical cancer, we have no doubt that future studies will rectify this and will find that video laparoscopic surgery will retain its position as the gold standard for treatment of lower stage cervical cancers. [31,32]

It is now time to train future surgeons so that they become proficient with minimally invasive surgical techniques; and we must also develop new methods and surgical techniques, which will ensure that surgical procedures are standardized.[5] The development of enabling devices, such as the robotic arm, has made minimally invasive technology accessible and easier to learn. All of these changes will enable us to achieve our ultimate goal, which is to standardize all surgical procedures.

We believe that future surgeries will be customizable, replicable, and ultimately standardized. Medical treatments are predominantly standardized on a global scale, as any patient receiving 325 mg of aspirin receives the same medication; but surgery is not like that. Two different surgeons performing the same procedure at the same hospital in neighboring operating rooms may do it differently. We must standardize surgery, so that everyone can undergo the same optimal surgery. Out of 7.6 billion people in the world, 5 billion people do not have access to proper surgical care, and 143 million more surgeries are needed annually.[33] 19 million deaths can be avoided annually if proper surgery is done.[33] Studies have shown that less experienced surgeons have higher complication and mortality rates than those of high-volume surgeons.[34] They also have a 2.5-fold increased operative time and 6-fold readmission rate compared to their more skilled counterparts.

How can surgery be standardized? In the future, the techniques of the best surgeons in each field will be combined to produce standardized procedures for different pathologies, which ensures that the highest quality of care is available to all. To do this, we must make better use of surgical technologies, which include digital surgery and subsequent new developments. Digital surgery is not only robotic surgery, but rather a combination of robotics, data analytics, machine learning, artificial intelligence, enhanced visualization, and enhanced

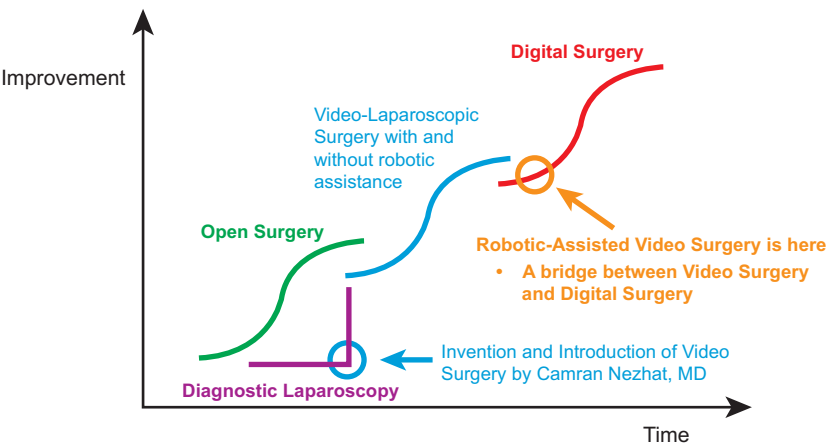


Figure 1 How video surgery with and without robotic assistance propelled minimally invasive surgery to replace open surgery.

instrumentation. It is a fusion of the human mind with artificial intelligence. Future surgeries will be highly specialized, and operations will be performed in high-volume surgical centers with robotic assistance. We predict that robots will enable human surgeons to lead and direct several simultaneous surgeries, analogous to a general who leads thousands of troops. The rapid expansion of technologies developed in the digital age will be utilized in medicine and surgery as well. From image-guided ultrasound therapy and prosthetic limbs to artificial vessels down to genome editing, the therapeutic possibilities are limitless, and should lead to incision-less surgeries.

The pace of advancement is accelerating. Improvements in farming during the Agricultural Age evolved over 8000 years, and manufacturing techniques during the Industrial Revolution improved over 100 years. However, the universal use of the internet occurred over only the 20 years since its inception, and the sequencing of the genome required 9 years. A task that previously required 90 years to complete with a computer can now be done in 1 hour. Computing power and speed will soon surpass the human mind. The rate of technological progress has demonstrated an exponential growth. Right now, we are on the cusp of transitioning to digital surgery and beyond. Progress relies on the change in thought. Technology will change the future. The rate of new discoveries is accelerating. As we progress, the rate of laparotomies will continue to decrease as it is being replaced by minimally invasive surgery. Surgeries all around the world

will become standardized with excellent results everywhere. We need a revolution on how we use energy in surgery.

Over the past 10 years, noninvasive procedures have begun to replace surgery or radiation as preferred therapeutic modalities. For example, high-intensity focused ultrasound (HIFU) is now used to ablate many types of solid tumors, and will eventually be used for many other applications. The precision associated with real-time imaging along with the use of sound waves makes HIFU a safe and cost-effective therapy. This is just one example of the many ways that new technologies will drastically improve the way we treat disease. Eventually, innovations in energy modalities could enable the Einstein equation ($E = \gamma mc^2$ or the relativistic energy-momentum relation) to advance our ability to precisely target cellular (and possibly subcellular) areas for treatment of cancer and to prevent other diseases. We already perform incisionless surgeries by combining new technology with new types of energy: HIFU, MRI-guided ultrasound, and Cyberknife are now being used for solid tumors. “Genome surgery” with CRISPR/Cas9 will soon be used to repair or replace defective DNA. An exciting future direction will be to combine the new surgical methods with advances in energy generation to more precisely correct defective tissue or even subcellular regions. Our vision for a brave new world is that all surgical procedures for tissue removal or debulking will be incision-less. Moreover, we believe that this brave new world will arrive in the not-too-distant future.

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