

LAPAROSCOPY, CULDOSCOPY AND GYNECOGRAPHY

Technique and Atlas

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Chicago, Illinois

VOLUME 1 IN THE SERIES

MAJOR PROBLEMS IN
OBSTETRICS AND GYNECOLOGY

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EMANUEL A. FRIEDMAN, M.D.
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Foreword

With this first volume in the series *Major Problems in Obstetrics and Gynecology*, we feel that we have begun to fill a great void, for detailed, comprehensive sources of information in encyclopedic or monographic form are not otherwise available in our specialty to students, house officers, generalists, and specialists. Our textbooks tend to be superficial in pertinent areas of great interest, and our specialty journals are frequently inundated with trivia. Under the auspices of the W. B. Saunders Company, we have embarked on a long-term project to try to correct these deficiencies. Eminently qualified authors have been sought out for this task, so as to provide scholarly and practical dissertations comprising readily usable information and summarizing clinical aspects of diagnosis and treatment of the major problems we will be presenting.

This first volume deals quite appropriately with techniques which afford the clinician diagnostic tools unparalleled in gynecology. The rebirth of gynecologic laparoscopy and its burgeoning popularity are undoubtedly the result of recent refinements in technique and, more pertinently, in instrumentation, specifically the introduction of cold light fiber optic technology. The simplicity of laparoscopy and its relative advantages over culdoscopy, here treated in a critical and balanced manner, account in large measure for both its growing acceptance and its rapidly expanding scope of applicability. Visual clarity, panoramic view, and potential for limited surgical exercises are additional attractive features.

Dr. Melvin R. Cohen, long active in the research and practical aspects of infertility and widely recognized for his expertise in culdoscopy and gynecography, writes with considerable authority based on extensive experience in the performance and modification of laparoscopic observation and surgery. This book is a distillate of his experience, and it reflects his tempered judgment, keen perception, and articulate literary style. The book treats primarily the practical aspects of the techniques, stressing pertinent features of anesthesia, indications, contraindications, and complications. The use of pho-

tography for appropriate documentation is detailed as well. The work provides the degree of thoroughness expected of Doctor Cohen. Of special note is the final chapter which contains an atlas of wonderfully detailed photographs illustrating a spectrum of pathologic conditions observed during culdoscopy and laparoscopy. These pictures illustrate the wide range of application of these techniques to many of the major problems in obstetrics and gynecology that this series will undertake to elucidate in due course.

EMANUEL A. FRIEDMAN, M.D., MED. SC.D.

Boston

With this first volume in the series *Major Problems in Obstetrics and Gynecology*, we feel that we have begun to fill a great void for detailed, comprehensive sources of information in encyclopedic or monographic form are not otherwise available in our specialty to students, house officers, generalists, and specialists. Our textbooks tend to be superficial in pertinent areas of great interest and our specialty journals are frequently inundated with trivia. Under the auspices of the W. B. Saunders Company, we have embarked on a long term project to try to correct these deficiencies. Eventually, qualified authors have been sought out for this task so as to provide scholarly and practical dissertations comprising readily usable information and summarizing clinical aspects of diagnosis and treatment of the major problems we will be presenting.

This first volume deals quite appropriately with techniques which afford the clinician diagnostic tools unparalleled in necessity. The rebirth of gynecologic laparoscopy and its burgeoning popularity are undoubtedly the result of recent refinements in technique and more pertinently, in instrumentation, specifically the introduction of cold light fiber optic technology. The simplicity of laparoscopy and its relative advantages over culdoscopy have resulted in a critical and balanced manner account in later treatment for both its growing acceptance and its rapidly expanding scope. Amplifying Visual clarity, panoramic view, and potential for limited surgical exercises are additional attractive features.

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Preface

My interest in laparoscopy was initiated by a visit to the Broca Hospital and Clinic in Paris in 1966. There Raoul Palmer graciously invited me to observe "gynecologic celioscopy," as he calls this technique, performed especially in the infertile woman. I was impressed with the magnificent view of the pelvic organs and with how easily such ancillary surgical procedures as tubal dilatation, biopsy, and cautery were performed. Later I was privileged to observe Patrick Steptoe, at Oldham Hospital in England, perform interval tubal sterilization via laparoscopy. Despite my earlier enthusiasm for culdoscopy, I realized that the abdominal approach had certain diagnostic, surgical, and photographic advantages.

As background, a historical review of laparoscopy (also called peritoneoscopy or celioscopy) is presented in Chapter 2. Due credit is given to the great innovators Ott, Kelling, Jacobaeus, and others who brought to the gynecologist this invaluable technique of viewing the pelvic organs with lighted instruments.

The modus operandi of laparoscopy is illustrated and the actual technique is described in detail. The various instruments that can be used are too numerous to describe, but the discussion includes all that are readily available to the American gynecologist.

The safe introduction of carbon dioxide gas into the peritoneal cavity is also discussed in detail. This is one of the most important steps in laparoscopy, and most of the complications that have been reported are due to faulty technique at this stage. My teacher and former associate Irving F. Stein, Sr., M.D., was an enthusiast of pneumoperitoneum. Used alone or combined with hysterosalpingography (gynecography), this is a valuable technique in the diagnosis of obscure pelvic disease (Chapter 16). My experience with pneumoperitoneum was a decided advantage in laparoscopy.

Indications and contraindications of both laparoscopy and culdoscopy are discussed, and complications are reviewed in detail. A description of ancillary procedures, such as lysis of adhesions, biopsy, cyst aspiration, and tubal sterilization, is presented as well.

Photography is important for documentation of findings and for teaching, and a black-and-white atlas of gynecologic endoscopy has therefore been included. A supplementary atlas of the original Ektachrome slides from which these illustrations were made is available from the publisher. Some of these slides will have been seen previously: at the American Fertility Society meeting in April, 1967, I presented an exhibit entitled "Culdoscopy versus Peritoneoscopy" that included a collection of Ektachrome transparencies illustrating the potential of endoscopy and especially laparoscopy. S. Leon Israel, M.D., editor of *Obstetrics and Gynecology*, encouraged me to write an article on the subject, and this was published with color plates (Cohen, 1968a).

Also in 1968, two motion pictures were produced: "Peritoneoscopy: Technique and Cinematography" and "Tubal Sterilization via Peritoneoscopy." The latter was made with the assistance of Alan Silverman, M.D., senior resident at Michael Reese Hospital and Medical Center, and both films are available on loan from La Rue Films, Inc., of Chicago. In 1969 our two residents, Marshall Bennett Taylor, M.D., and Martin B. Kass, M.D., with my cooperation, produced a third motion picture, "Operative Laparoscopy: Tubal Sterilization," which was shown at the meeting of the Chicago Gynecological Society on May 16, 1969. At that time the paper that appears as Chapter 9 of this book was presented.

For some time I had been exploring the possibility of avoiding the use of general anesthesia in laparoscopy. With the cooperation of the Department of Anesthesia of Michael Reese Hospital, and the former director of that department, Julius H. Bolgla, M.D., I am now performing laparoscopy under local anesthesia plus Innovar (Chapter 4). A new motion picture, "Laparoscopy: Refinements in Technique and Anesthesia," soon to be available, demonstrates this procedure under neuroleptanalgesia.

Joseph Rovinsky, M.D., of Mount Sinai Hospital, New York, requested that I rewrite the chapter on peritoneoscopy for Davis's *Gynecology and Obstetrics*, originally prepared by Ruddock in 1939. In doing so I felt the need to amplify this material and present it as a book with atlas, and this was the origin of the present work. I feel privileged to have been invited by Emanuel A. Friedman, M.D., of the Harvard Medical School and Beth Israel Hospital, to present my material in monograph form for this new Saunders series. As our former chairman, Dr. Friedman had given me every assistance in the establishment of laparoscopy at Michael Reese Hospital. I trust that in writing this book I will stimulate interest in endoscopy and provide additional teaching material for meaningful courses in both laparoscopy and culdoscopy.

I wish also to honor my good friend Albert Decker, M.D., the "father of culdoscopy." It is my hope that despite the current enthusiasm for laparoscopy, culdoscopy will continue to be taught and performed at

medical centers. The two techniques complement each other, and they are compared in Chapter 13.

I have been nearly overwhelmed with requests to teach laparoscopy. Therefore, this text has been prepared to give a step-by-step detailed description of the technique. I have tried to make the procedure as simple as possible and to show how to avoid problems in anesthesia, in the introduction of the pneumoperitoneum, and finally in the introduction of the trocar and laparoscope. It is strongly suggested that one person, or, preferably, a small team of gynecologic endoscopists, be trained at each large hospital and medical center so that this invaluable technique will be available to the entire staff. Although laparoscopy, known since the early part of this century, has been discarded and then rediscovered at intervals, I am confident that with the availability of fine optical instruments and safe anesthesia the technique is here to stay.

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Acknowledgments

Grateful acknowledgment is due the operating room staff of Michael Reese Hospital for their invaluable help in establishing laparoscopy, first as an experimental technique and now as a routine diagnostic and operative procedure. I want to apologize to my colleagues for any inconvenience caused by my taking additional operating room time for laparoscopic photography.

I have been fortunate to have had the cooperation of L. Streifeneder and L. Wettermann of the Eder Instrument Company, who supplied me with fine instruments and encouragement. Mr. Streifeneder even came into the hospital operating room to insure that the laparoscopy instruments and camera attachments were in perfect order.

The endoscopic photographs are my own. The other illustrations are the work of Gunter Deutch, La Rue Films, Inc., June Hill Pedigo, medical illustrator, and Stanley Kaval and Obie Evans, photographers.

For their patience in typing the many drafts of the manuscript, Mrs. Jeanne Lieberman and my wife Miriam deserve my appreciation.

Our present department chairman, Antonio Scommegna, M.D., and our esteemed senior obstetrician and gynecologist at Michael Reese Hospital, J. P. Greenhill, M.D., were kind enough to review my material.

The interest and enthusiasm shown by the staff of the W. B. Saunders Company have greatly stimulated my efforts.

Finally, I wish to acknowledge the understanding and enthusiasm of my children, Nancy and Alan. And most helpful, most encouraging, and the most important of all was my wife, Miriam.

MELVIN R. COHEN, M.D.

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Chapter One

INTRODUCTION. MODUS OPERANDI OF LAPAROSCOPY

Laparoscopy (peritoneoscopy, celioscopy) is endoscopic visualization of the peritoneal cavity through the anterior abdominal wall after establishment of a pneumoperitoneum. Unlike culdoscopy (transvaginal endoscopy), this technique is also useful to the internist and surgeon evaluating abdominal problems, especially liver disease. Gynecologic laparoscopy refers to the application of this technique for the diagnosis of obscure pelvic diseases.

It has been said that the gynecologist must have eyes at the ends of his fingers so that he can delineate the size, shape, and position of the uterus and evaluate the adnexa. Pathologic conditions due to cysts, inflammation, or endometriosis must be differentiated from the normal tube and ovary. The vaginal or bimanual examination requires training and experience, and even the trained gynecologist frequently has difficulties making a diagnosis. Symptoms such as severe pelvic pain are sometimes unexplained by what can be palpated vaginally. The need for refinements in diagnostic techniques is obvious.

Inspection of the external genitalia, the vagina and cervix, as well as palpation and percussion of the abdomen, are very important and when combined with bimanual examination lead to the correct diagnosis in the majority of patients. When the diagnosis is in doubt, the gynecologist needs to take a good look at the internal genitalia. If this can be done without laparotomy, safely and under minimal anesthesia and discomfort, it would appear to be a worthwhile proce-

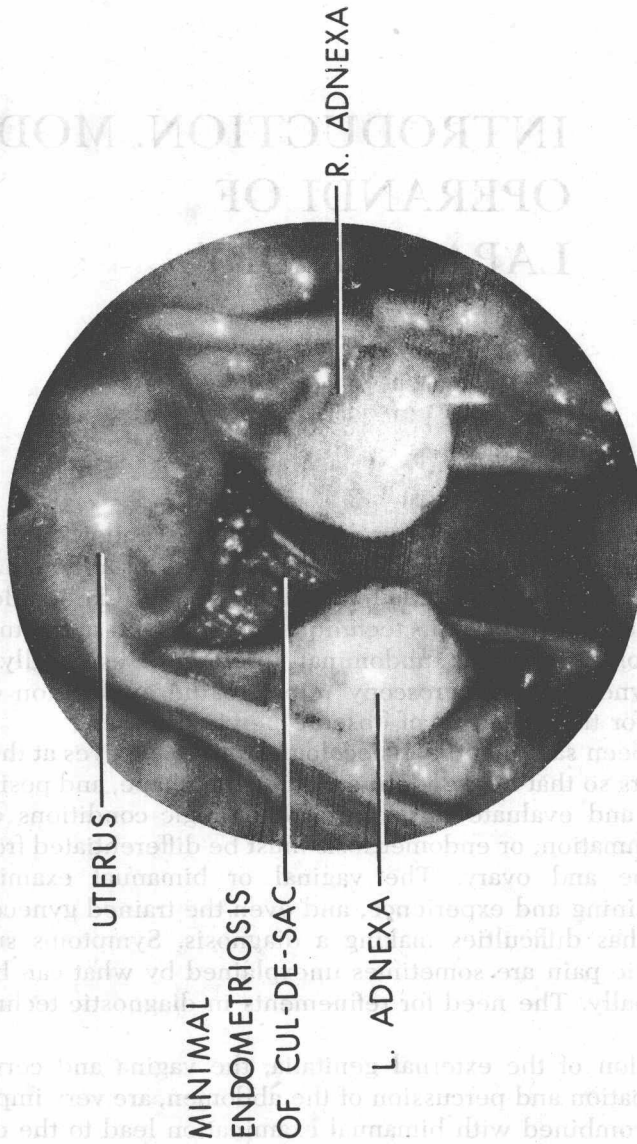


Figure 1-1. Panoramic view at laparoscopy of normal uterus and adnexa with minimal cul-de-sac endometriosis. (From an Ektachrome transparency.)

ture. By means of laparoscopy the gynecologist can obtain the same view of the pelvic organs (Fig. 1-1) as is seen at laparotomy.

Although this method has been known since 1901, Palmer in 1947 perfected the technique of "gynecologic celioscopy" by showing that the pelvic organs could be better visualized with the use of an intra-uterine patency cannula. The uterus and its appendages can be moved freely up and down using the cannula as a lever.

MODUS OPERANDI

Figure 1-2 is a schematic drawing of gynecologic laparoscopy. A pneumoperitoneum is performed so that the intestines are separated from the pelvic organs. The bladder is catheterized. A uterine patency cannula is inserted through the cervix and hooked into position. This serves as a lever so that the uterus and its appendages may be moved up out of the cul-de-sac to enable the surgeon to observe structures behind these organs. The cannula may also be used for tubal patency, employing either methylene blue or indigo carmine dye for injection. The patient is placed in Trendelenburg

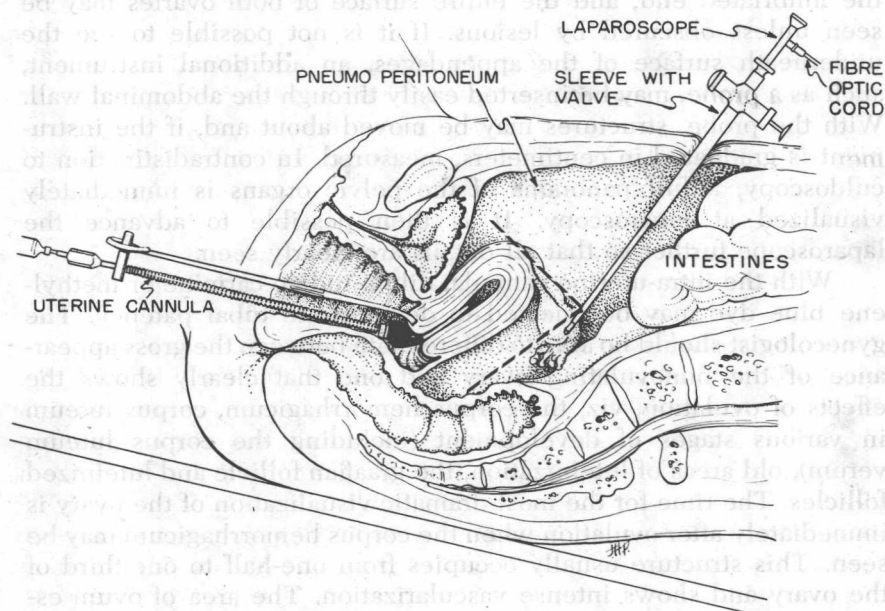


Figure 1-2. Schematic drawing of gynecologic laparoscopy. (From Cohen, M. R. [1968a]: Culdoscopy vs. peritoneoscopy. *Obstet. Gynec.* 31:310.)

position to facilitate displacement of the intestines out of the pelvis. The laparoscope passes through the trochar sleeve, which is fitted with a valve to prevent the escape of gas from the peritoneal cavity. A light cord from the power supply is attached to the laparoscope.

The View Obtained at Laparoscopy

Those who have never seen this technique performed are usually amazed at the panorama of the pelvic and lower abdominal organs. The view obtained at laparoscopy is identical to the appearance of these organs at the time of laparotomy and serves to immediately orient the gynecologist. On the other hand, the internist, who is more concerned with upper abdominal problems, might be confused by the appearance of a small ovarian cyst or an endometrial implant. One must have a thorough knowledge of gross anatomy and gross pathology for the proper interpretation of findings.

The peritoneum over the previously catheterized bladder may be seen, and the round ligaments are clearly visualized. Should the uterus be in retroflexion, it can be moved anteriorly with the patency cannula so that the cul-de-sac may be seen. The uterosacral ligaments are easily identified and pathologic aberrations of the cul-de-sac, such as endometriosis, are clearly definable.

The fallopian tubes may be identified from the uterine end to the fimbriated end, and the entire surface of both ovaries may be seen unless obscured by lesions. If it is not possible to see the underneath surface of the appendages, an additional instrument, such as a probe, may be inserted easily through the abdominal wall. With the probe, structures may be moved about and, if the instrument is graduated in centimeters, measured. In contradistinction to culdoscopy, a full panorama of the pelvic organs is immediately visualized at laparoscopy. It is then possible to advance the laparoscope further so that all details are clearly seen.

With the intra-uterine cannula, dilute indigo carmine or methylene blue dye may be injected to demonstrate tubal patency. The gynecologist should be able to differentiate between the gross appearance of the nonovulating ovary and one that clearly shows the effects of ovulation, viz, the corpus hemorrhagicum, corpus luteum in various stages of development (including the corpus luteum verum), old areas of luteinization, the graafian follicle and luteinized follicles. The time for the most dramatic visualization of the ovary is immediately after ovulation when the corpus hemorrhagicum may be seen. This structure usually occupies from one-half to one-third of the ovary and shows intense vascularization. The area of ovum escape may have the appearance of a stigma with or without coagulum. There may be evidence of recent hemorrhage. We have compared the appearance of the corpus hemorrhagicum to that of a bloodshot eye.

The size, shape, and position of the uterus may be easily evaluated via laparoscopy. Color of the organ varies with the intensity of illumination.

A uterus enlarged by an intramural leiomyoma must be differentiated from an early pregnancy. A pelvic examination that always precedes laparoscopy may help in making this distinction. The older literature describes the value of laparoscopy in diagnosing pelvic tuberculosis. This disease has become infrequent and I have not had any experience with this condition. The reddish or purplish implants compatible with the gross diagnosis of endometriosis frequently involve the peritoneum, uterosacral ligaments, cul-de-sac, and ovaries. Biopsy is usually unnecessary to confirm this diagnosis. Early malignant lesions of the ovaries may be diagnosed on gross inspection and biopsy. Ovarian carcinoma with metastases and ascites may also be diagnosed in this manner. It is my opinion that whenever curettage is indicated for bleeding states, endoscopic examination, either by culdoscopy or laparoscopy, is of value in determining possible ovarian etiology.

Although the gynecologist is able to visualize the upper abdomen, he is not qualified to evaluate the gross appearance of the liver, whether normal or abnormal. We have been frequently requested by the internist to perform upper abdominal laparoscopy to visualize the liver and gallbladder and to aid in obtaining liver biopsy. Upper abdominal laparoscopy is an entirely different procedure and should not be performed by the gynecologist. The gastroenterologist trained in gastroscopy will find this technique easy to learn and rewarding.

Chapter Two

HISTORICAL BACKGROUND

Ott of Petrograd, in 1901, was the first to introduce optical inspection of the abdominal cavity. He placed his patients in extreme Trendelenburg position at a 45° angle on a special table with shoulder braces and supports for the legs. By means of culdotomy, vaginal retractors, and a head mirror with incandescent light, he was able to visualize the pelvic and abdominal organs. Ott was primarily a vaginal gynecologic surgeon and he demonstrated that pelvic and even intestinal surgery could be accomplished with this technique. He showed that in steep Trendelenburg position negative pressure occurred and the bowel was displaced out of the pelvis into the subdiaphragmatic space. Deep general anesthesia was further required to keep the visual field free from loops of intestines. His remarkable operation was called "ventroscopy."

Kelling of Dresden presented a paper in Hamburg in 1901 (published in 1902), entitled "Ueber Oesophagoskopie, Gastroskopie und Kōlioskopie." The last-named procedure (celioscopy) was demonstrated on a dog, and this first-recorded method of abdominal endoscopy is quite similar to the technique now employed. A pneumoperitoneum was first produced with a needle and filtered air. A trochar was then inserted through an anesthetized area in the abdominal wall and a thin Nitze cystoscope inserted. In this way Kelling was able to visualize the contents of the abdominal cavity. Nitze had introduced the cystoscope in 1878; Kelling was the first to extend the use of this valuable instrument to view a body cavity by creation of an artificial opening.

Jacobaeus of Stockholm, in 1910, was the first to describe laparoscopy, as he called this technique, in the human. Jacobaeus