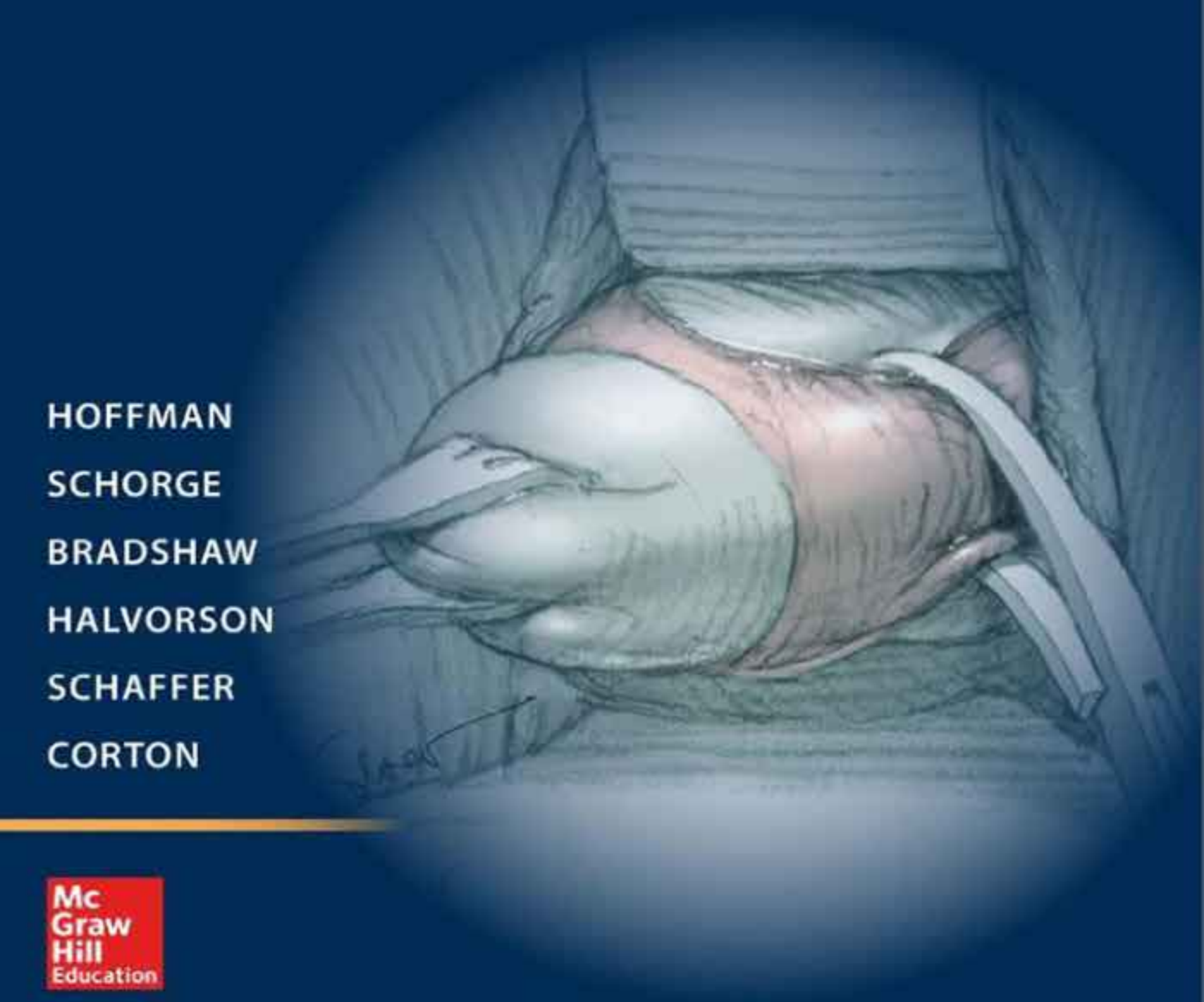
THIRD EDITION

Williams
GYNECOLOGY



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Williams GYNECOLOGY

THIRD EDITION

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DEDICATION

This edition of *Williams Gynecology* is dedicated to David L. Hemsell, MD, who served as Director of the Division of Gynecology at the University of Texas Southwestern Medical Center and Parkland Memorial Hospital for more than 20 years. During this tenure, his national awards have included a Meritorious Achievement award from the Infectious Diseases Society of America and an Outstanding Service award from the American College of Obstetricians and Gynecologists.

Early in his training, Dr. Hemsell joined the Air Force and served our country as a Flight Medical Officer. In these years, he pursued specialty training in reproductive endocrinology with Dr. Paul MacDonald. He joined our faculty as the Division Director of Gynecology in 1977. In addition to his Director role, Dr. Hemsell was the Chief of Gynecology at Parkland Memorial Hospital and Medical Director of the Parkland Obstetrics and Gynecology Emergency Room. In these roles, Dr. Hemsell created an environment in which evidence-based medicine was the standard for care. Accordingly, patients, residents, and junior faculty all benefitted from this scientific health care approach. He also served as Director of the Faculty Sexual Assault Examination and Testimony Program. In that role, he coordinated the examinations of many thousands of sexual assault victims and the collection of legal evidence. As a result of his efforts, Dallas County has a system regarded as among the best in medical and legal care for these victims.

During his academic career, Dr. Hemsell added foundational knowledge regarding the etiology, pathogenesis, and treatment of female pelvic infections, especially those following gynecologic surgeries. With this expertise, he served as journal reviewer for multiple journals. He has added to academic knowledge through his nearly 50 book chapters and 100 peer-reviewed articles on multiple gynecologic topics.

For us in the Department of Obstetrics and Gynecology, Dr. Hemsell plays an important role of mentor and colleague. His experience and clinical expertise are invaluable and provide a valuable sounding board for challenging gynecology cases. On so many levels, we have benefitted greatly from his academic and clinical contributions.

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PREFACE

The first edition of *Williams Obstetrics* was published over a century ago. Since then, the editors of this seminal text have presented a comprehensive and evidenced-based discussion of obstetrics. Patterned after our patriarch, *Williams Gynecology* provides a thorough presentation of gynecology's depth and breadth. In Section 1, general gynecology topics are covered. Sections 2 provides chapters covering reproductive endocrinology and infertility. The developing field of female pelvic medicine and reconstructive surgery is presented in Section 3. In Section 4, gynecologic oncology is discussed.

Traditionally, gynecologic information has been offered within the format of either a didactic text or a surgical atlas. However, because the day-to-day activities of a gynecologist blends these two, so too did we. The initial four sections of our book describe the evaluation and medical treatment of gynecologic problems. The remaining two sections focus on the surgical patient. Section 5 offers detailed anatomy and a discussion of perioperative considerations. Our final section presents an illustrated atlas for the surgical correction of conditions described in Sections 1 through 4. To interconnect this content, readers will find page references within one chapter that will direct them to complementary content in another.

Although discussions of disease evaluation and treatment are evidence based, our text strives to assist the practicing gynecologist and resident. Accordingly, chapters are extensively complemented by illustrations, photographs, diagnostic algorithms, and treatment tables.

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ACKNOWLEDGMENTS

During the creation and production of our textbook, we were lucky to have the assistance and support of countless talented professionals both within and outside our department.

First, a task of this size could not be completed without the unwavering support provided by our Department Chairman, Dr. Steven Bloom, and Vice-Chairman, Dr. Barry Schwarz. Their financial and academic endorsement of our efforts has been essential. Without their academic vision, this undertaking could not have flourished.

In constructing a compilation of this breadth, the expertise of physicians from several departments was needed to add vital, contemporaneous information. We were fortunate to have Dr. April Bailey, with joint appointments in the Department of Radiology and Department of Obstetrics and Gynecology, add her insight and knowledge as a specialist in radiology. Her many stunning images contribute to the academic richness of this edition. From the Department of Pathology, Dr. Kelley Carrick also shared generously from her cadre of outstanding images. She translated her extensive knowledge of gynecologic pathology into concepts relevant for the general gynecologist. From the Department of Surgery at Johns Hopkins University, Dr. David Euhus lent his considerable knowledge of breast disease to contribute both classic and state-of-the-art information to his truly comprehensive chapter, founded on his broad research and clinical expertise. From the Department of Psychiatry here at the University of Texas Southwestern Medical Center at Dallas and from the University of North Carolina at Chapel Hill School of Medicine, we were lucky to have Drs. Geetha Shivakumar and Anna Brandon provide an extensive discussion of psychosocial issues. They expertly distilled a broad topic into a logically organized, practical, and complete presentation. In addition, Dr. Gretchen Stuart, formerly of our department and now a faculty member at the Department of Obstetrics and Gynecology of the University of North Carolina at Chapel Hill, lent her considerable talents in summarizing contraceptive methods and sterilization techniques. Many warm thanks are extended to Dr. Rajiv Gala, also formerly of our department and now of the Ochsner Clinic. Rajiv masterfully organized and summarized chapters on ectopic pregnancy and perioperative practice. His extensive review of the literature and evidence-based writing shines through these chapters. In this edition, new contributors include Drs. Anthony Russell and Andrea Russo from the Department of Radiation Oncology at Massachusetts General Hospital—Harvard Medical School. In their chapter on radiation therapy, they adeptly provided clear explanations of this therapy's fundamentals and offered extensive suggestions for clinical management of patient complications that may be encountered.

Within our own department, the list is too long and the words are too few to convey our heartfelt thanks to all of our department members for their generous contributions. From our Gynecology Division, many thanks are extended to Drs. Elysia Moschos and April Bailey, who sculpted a clear and detailed summary of traditional and new gynecologic imaging tools. In this edition, these two authors updated radiologic images as needed to present ultimate examples of normal anatomy and gynecologic pathology. We were also lucky to have experts in the field of preinvasive lesions of the lower genital tract, Drs. Claudia Werner and William Griffith. They crafted an information-packed discussion of this topic. In addition, Dr. Griffith has been a steadfast advocate of our project and has added extensive photographic content to many of our chapters. Drs. David Rahn and Eddie McCord teamed to update the chapter on gynecologic infection. Their extensive patient-care experience and rigorous literature review added greatly to the academic and clinical value of this chapter. We were also fortunate to have the expert writing talents of Drs. Mayra Thompson and Kimberly Kho, who provided a compelling and comprehensive discussion of minimally invasive surgery. Our textbook benefitted greatly from the clinical savvy and teaching-centric information that David Rogers and David Owens provided to their chapter. Also, Dr. Rogers has been a long-time supporter of our textbook. We are indebted to him for many of the classic surgical photographs in this edition. Intraoperative fundamentals were thoroughly and logically presented by Drs. Cherine Hamid and Sunil Balgobin. Their strengths in clinical practice and resident teaching are evident in their well-organized and essential chapter. Once again, blending experience and academic fundamentals, Dr. Mary Jane Pearson offered a comprehensive but concise primer on well care for the gynecologic patient.

Our Reproductive Endocrinology and Infertility Division provided other talented physicians and writers. Dr. Kevin Doody lent his considerable clinical and academic prowess in the treatment of infertility. He penned a chapter that clearly describes the state of the art in this field. Dr. Doody was also a kind benefactor with his spectacular clinical photographs on the topic and contributed these generously to numerous chapters. In addition, Dr. Ellen Wilson brought her wealth of clinical experience to chapters on pediatric gynecology and androgen excess. Drawing from her academic and clinical expertise, she crafted chapters that presented practical, prescriptive, and comprehensive discussions of these topics.

Dr. Marlene Corton is a skilled urogynecologist and has written extensively on pelvic anatomy. We were thrilled to have her create stunning chapters on anatomy and anal incontinence. Also from the Urogynecology and Female Pelvic Reconstruction Division, Drs. Clifford Wai and David Rahn added expanded content to their chapter on urinary incontinence. Dr. Wai also masterfully updated his chapter on

vesicovaginal fistula and urethral diverticulum. Special thanks are extended to Dr. Ann Word and her contributions to our chapter on pelvic organ prolapse. Her expertise in extracellular matrix remodeling of the female reproductive tract added fundamental content to the discussion of prolapse physiology.

Dr. David Miller generously contributed his talents without hesitation, and we are indebted to him for his altruism toward our project. In addition, the Division of Gynecologic Oncology offered a deep bench of talented writers. The topic of vulvar cancer was thoroughly covered by Dr. Jayanthi Lea. Dr. Lea also assisted with updating our atlas and added essential steps for minimally invasive approaches. Her strengths in clinical practice and resident teaching are evident in her well-organized and evidence-based chapters. We also benefitted from Dr. Debra Richardson's comprehensive presentation and clinical discussions of cervical and vaginal cancer in her two chapters. She has been a true advocate of both the text and study guide. Dr. Siobhan Kehoe described with clarity and clinical relevance the care and treatment of women with endometrial cancer. We were appreciative of Dr. Matthew Carlson, who teamed with David Miller to present the varied pathology and treatment of uterine sarcoma.

With this edition, several of our valued authors have turned their efforts to other promising pursuits. We are grateful to Drs. F. Gary Cunningham, Bruce Carr, David Hemsell, Larry Word, and Phuc Nguyen for their prior contributions to *Williams Gynecology*. All with well-known and well-established careers, they generously contributed their academic skills without hesitation. We are indebted to them for their altruism toward our project.

Of these academicians, Dr. F. Gary Cunningham provided the academic vision that led to the creation of this text. Dr. Cunningham has been the senior author for seven editions of Williams Obstetrics, spanning over 25 years. As such, we benefited greatly from his writing genius, his meticulous organization, and his tenacity to task. His dedication to evidence-based medicine established the foundation on which our textbook was built. We feel privileged to have learned the craft of clear, concise academic summary from a consummate master.

New beautiful and detailed artwork in our atlas this edition was drawn by Mr. Lewis Calver, here at the University of Texas Southwestern Medical Center at Dallas. Again for this edition, he paired his academic talents with Dr. Marlene Corton to create updated hysterectomy and urogynecologic images. Both of these anatomists committed countless hours in the cadaver laboratory and in the library to create academically new presentations. These renderings were crafted and tailored with the gynecologic surgeon in mind to depict important techniques and anatomy for these surgeries. Dr. Jayanthi Lea joined this gifted duo to add complementary and informative illustrations to her description of minimally invasive cancer surgeries.

We also acknowledge the efforts of our atlas artists from the first two editions: Marie Sena, Erin Frederikson, Jordan Pietz, Maya Shoemaker, SangEun Cha, Alexandra Gordon, Jennie Swensen, Amanda Tomasikiewicz, and Kristin Yang. Additionally, alumni from the Biomedical Communications Program at the University of Texas Southwestern Medical Center provided seminal pieces. These alumni include Katherine Brown, Thomas "T. J." Fels, Belinda Klein, Anne Matuskowitz, Lindsay Oksenberg, Kimberly VanExel, and faculty member Richard P. Howdy, Jr. Also, Ms. Kimberly Hoggatt Krumwiede graciously provided several image series to help clarify the steps and missteps of reproductive tract development.

Within our text, images add powerful descriptive content to our words. Accordingly, many, many thanks are extended to those who donated surgical and clinical photographs. Of our contributors, many beautiful photographs within our book were taken by Mr. David Gresham, Chief Medical Photographer at the University of Texas Southwestern Medical Center. Dave's eye for detail, shading, and composition allowed even simple objects to shine and be illustrated to their full potential. He has been an advocate and valued consultant. Our pathology images were presented at their best thanks to Mr. Mark Smith, a graphics designer here at the University of Texas Southwestern Medical Center. His expertise with micrographs improved the clarity and visual aesthetic of many our microscopic images.

The providers in the Obstetrics and Gynecology Emergency Services (OGES) at Parkland Hospital were huge allies in our acquisition of images to illustrate normal and abnormal gynecologic findings. The skilled women's health care nurse practitioners have been true supporters of our efforts, and we sincerely thank them.

We are truly indebted to our administrative staff. For this project, we were lucky to have Ms. Sandra Davis serve as our primary administrative assistant. We are greatly appreciative of her tremendous efforts, professionalism, and efficiency. Ms. Ellen Watkins was a valuable assistant in obtaining needed journal articles. She truly helped to keep our project evidence-based. None of our image and text production would have been possible without the brilliant information technology team in our department. Knowledgeable and responsive, Mr. Charles Richards and Mr. Thomas Ames have supported our project since the first edition. We could not do our job without their expertise.

Williams Gynecology was sculpted into its final form by the talented and dedicated group at McGraw-Hill Education. Once again, Ms. Alyssa Fried has brought her considerable intelligence, energetic work ethic, and creativity to our project. Her attention to detail and organizational talents have kept our project on track with efficiency and style. Our words fall well short in expressing our gratitude to her. Ms. Samantha Williams served as assistant to Ms. Fried, and we extend warm thanks for her tremendous support. Her efficiency, professionalism, hard work, accuracy, and positive attitude made coordination of this project a dream. Mr. Andrew Moyer joined our project during its final sculpting. He has taken our project under his care and has adeptly shepherded it to completion with a calm and efficient style. We happily look forward to many future collaborative editions together.

Without the thoughtful, creative efforts of many, our textbook would be a barren wasteland of words. Integral to this process are Armen Ovsepyan, at McGraw-Hill Education, and Alan Barnett of Alan Barnett Design. Mr. Richard Ruzycka served as production supervisor for this edition of our textbook. He adeptly kept our project on track through an array of potential hurdles. Special

thanks are extended to Mr. Joseph Varghese and Dr. Shetoli Zhimomi at Thomson Digital. They and their artistic team assisted us in revising many of our text images. Their attention to detail and accurate renderings added important academic support to our words.

Our text took its final shape under the watchful care of our compositors at Aptara, Inc. Specifically, we thank Ms. Indu Jawwad for her talents in skillfully and expediently coordinating and overseeing composition. Her dedicated attention to detail and organization were vital to completion of our project. Her pleasant professionalism was appreciated daily. Also at Aptara, Mr. Shashi Lal Das served a crucial task of quality control and assisted in creating beautiful chapter layouts to highlight our content aesthetically and informatively. Special thanks go to Ms. Kristin Landon. As copyeditor for now several editions of both *Williams Obstetrics* and *Williams Gynecology*, Kristin has added precision and clarity to our efforts. Her pleasant and patient professionalism has made our text better.

We offer a sincere "thank you" to our residents in training. Their curiosity keeps us energized to find new and effective ways to convey age-old as well as cutting-edge concepts. Their logical questions lead us to holes in our text, and thereby, always help us to improve our work. Moreover, many of the photographs in this textbook were gathered with the help of our many residents.

In addition, the contributors to this text owe a significant debt to the women who have allowed us to participate in their care. The images and clinical expertise presented in this text would not have been possible without their collaborative spirit to help us move medical knowledge forward.

Last, we offer an enthusiastic and heartfelt "thank you" to our families and friends. Without their patience, generosity, and encouragement, this task would have been impossible. For them, too many hours with "the book" left them with new responsibilities. And importantly, time away from home left precious family memories and laughs unrealized. We sincerely thank you for your love and support.

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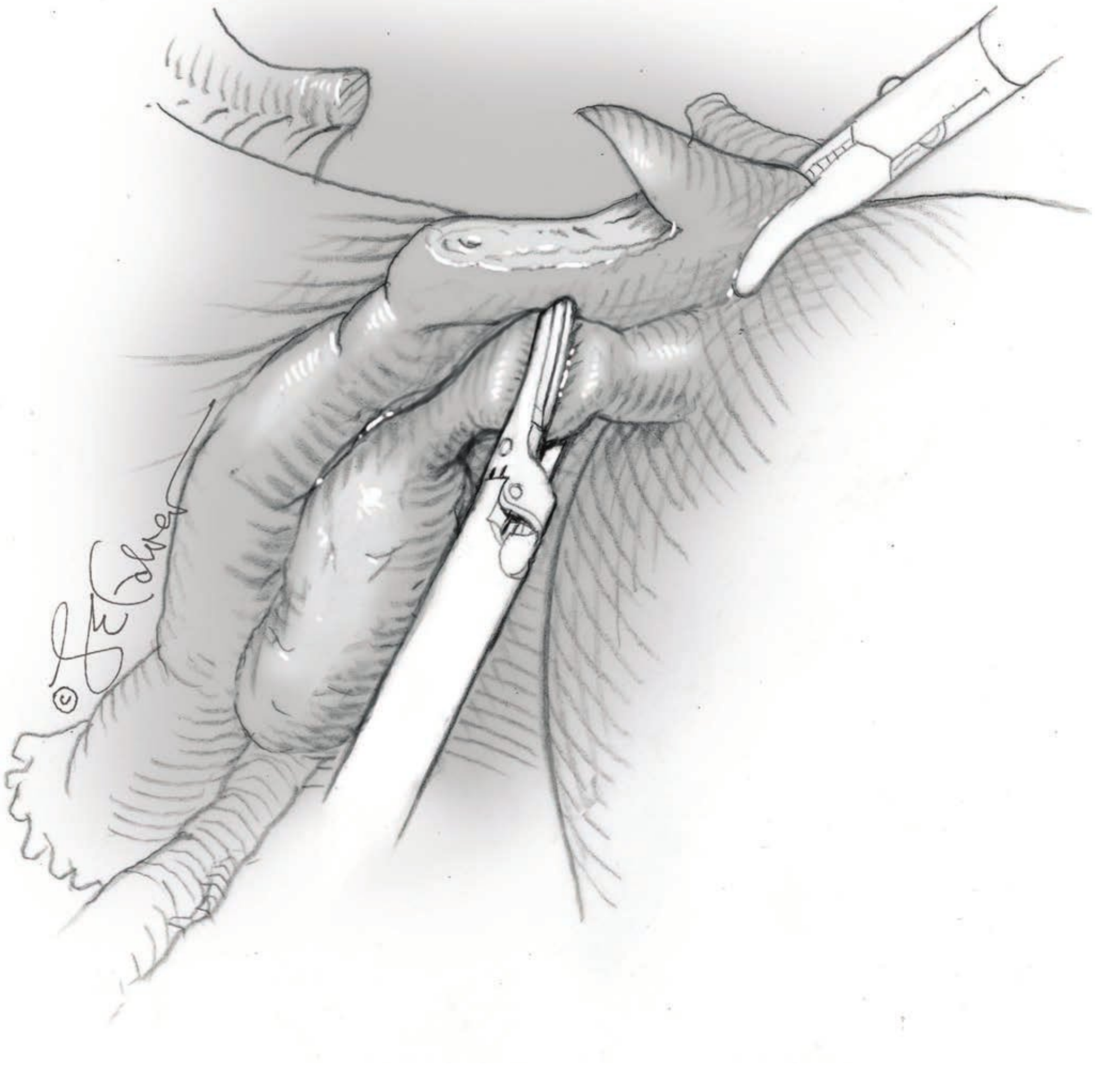
SECTION 1

BENIGN GENERAL GYNECOLOGY



CHAPTER 1

Well Woman Care

Serving as both specialist and primary care provider, a gynecologist has an opportunity to diagnose and treat a wide variety of diseases. Once problems are identified, clinicians, in consultation with the patient, determine how best to manage chronic medical issues based on their experience, practice patterns, and professional interests. Although some conditions may require referral, gynecologists play an essential role in patient screening, in emphasizing ideal health behaviors, and in facilitating appropriate consultation for care beyond their scope of practice.

Various organizations provide preventive care recommendations and update these regularly. Commonly accessed guidelines are those from the American College of Obstetricians and Gynecologists (ACOG), Centers for Disease Control and Prevention (CDC), U.S. Preventive Services Task Force (USPSTF), and American Cancer Society.

MEDICAL HISTORY

During a comprehensive well-woman visit, patients are first queried regarding new or ongoing illness. To assist with evaluation, complete medical, social, and surgical histories are obtained and include obstetric and gynecologic events. Gynecologic topics usually cover current and prior contraceptives; results from prior sexually transmitted disease (STD) testing, cervical cancer screening, or other gynecologic tests; sexual history, described in Chapter 3 (p. 60); and menstrual history, outlined in Chapter 8 (p. 182). Obstetric questions chronicle circumstances around deliveries, losses, or complications. Current medication lists include both prescription and over-the-counter drugs and herbal agents. Also, prior surgeries, their indications, and complications are sought. A social history covers smoking and drug or alcohol abuse. Screening for intimate partner violence or depression can be completed, as outlined on page 18 and more fully in Chapter 13 (p. 298). Discussion might also assess the patient's support system and any cultural or spiritual beliefs that might affect her general health care. A family history helps identify women at risk for familial or multifactorial disease such as diabetes or heart disease. In families with prominent breast, ovarian, or colon cancer, genetic evaluation may be indicated, and criteria are outlined in Chapters 33 (p. 707) and 35 (p. 736). Moreover, a significant family clustering of thromboembolic events may warrant testing, as describe in Chapter 39 (p. 836), especially prior to surgery or hormone initiation. Last, a review of systems, whether performed by the clinician or office staff, may add clarity to new patient problems.

For adults, following historical inventory, a complete physical examination is completed. Many women present to their gynecologist with complaints specific to the breast or pelvis. Accordingly, these are often areas of increased focus, and their evaluation is described next.

PHYSICAL EXAMINATION

Breast Examination

Clinical Evidence

Self breast examination (SBE) is an examination performed by the patient herself to detect abnormalities. However, studies have shown that SBE increases diagnostic testing rates for ultimately benign breast disease and is ineffective in lowering breast cancer mortality rates (Kösters, 2008; T omas, 2002). Accordingly, several organizations have removed SBE from their recommended screening practices (National Cancer Institute, 2015; Smith, 2015; U.S. Preventive Services Task Force, 2009). T at said, the American College of Obstetricians and Gynecologists (2014b) and the American Cancer Society (2014) recommend breast self-awareness as another method of patient self-screening.

Self-awareness focuses on breast appearance and architecture and may include SBE. Women are encouraged to report any perceived breast changes for further evaluation.

In contrast, clinical breast examination (CBE) is completed by a clinical health-care professional and may identify a small portion of breast malignancies not detected with mammography. Additionally, CBE may identify cancer in young women, who are not typical candidates for mammography (McDonald, 2004). One method includes visual inspection combined with axillary and breast palpation, which is outlined in the following section.

T e American College of Obstetricians and Gynecologists (2014b) recommends that women receive a CBE every 1 to 3 years between ages 20 and 39. At age 40, CBE is completed annually. T at said, the USPSTF (2009) and the American Cancer Society report insufficient evidence to recommend routine CBE (Oeffinger, 2015).

Breast Examination

Initially during CBE, the breasts are viewed as a woman sits on the table's edge with hands placed at her hips and with pectoralis muscles f exed (Fig. 1-1). Alone, this position enhances asymmetry. Additional arm positions, such as placing arms above the head, do not add vital information. Breast skin is inspected for breast erythema; retraction; scaling, especially over the nipple; and edema, which is termed peau d'orange change. T e breast and axilla are also observed for contour symmetry.

Following inspection, axillary, supraclavicular, and infraclavicular lymph nodes are palpated most easily with a woman seated and her arm supported by the examiner (Fig. 1-2). T e axilla is bounded by the pectoralis major muscle ventrally and

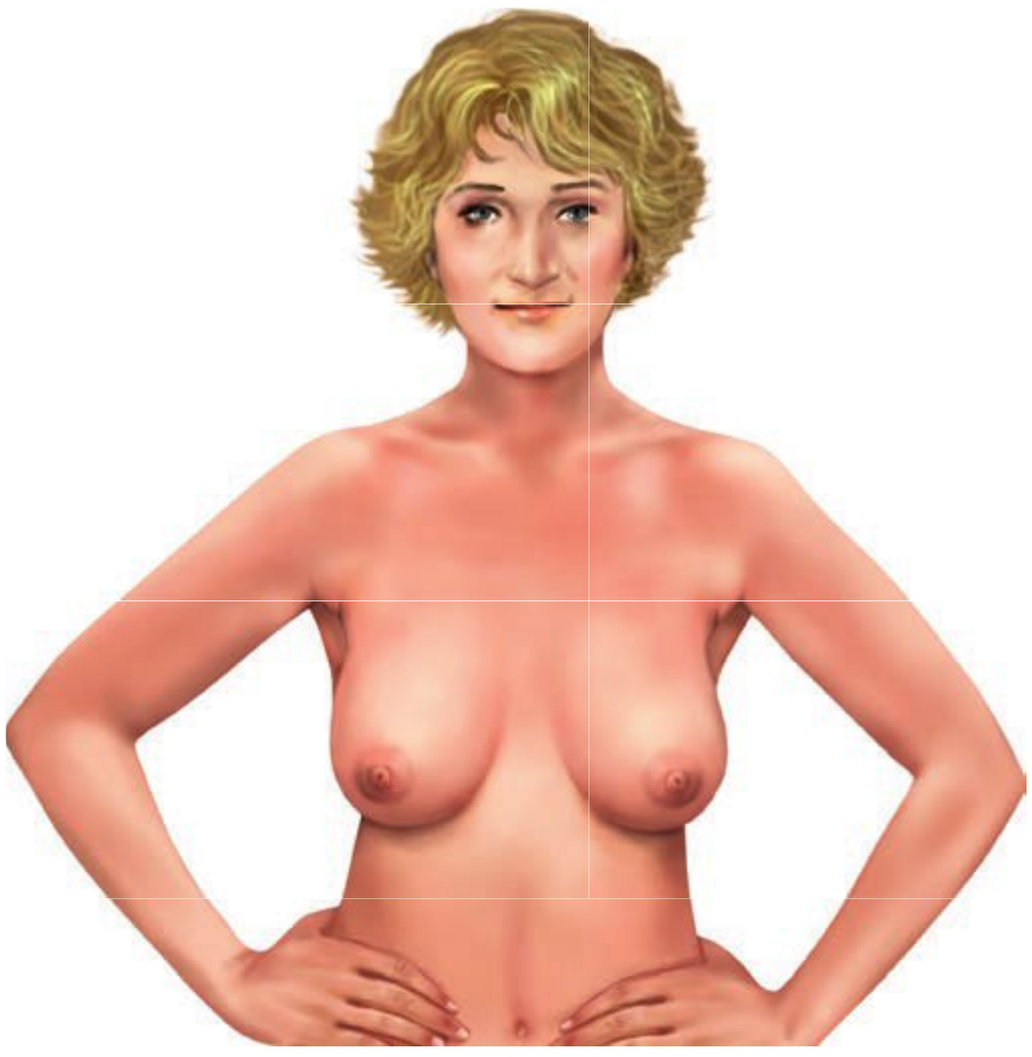


FIGURE 1-1 During visual breast inspection, hands are pressed against the waist to flex the pectoralis muscles. With the patient leaning slightly forward, breasts are visually inspected for breast contour asymmetry or skin dimpling.

FIGURE 1-2 One method of axillary lymph node palpation. Finger tips extend to the axillary apex and compress tissue against the chest wall in the rolling fashion shown in Figure 1-4. The patient's arm is supported by the examiner.

the latissimus dorsi muscle dorsally. Lymph nodes are detected as the examiner's hand glides from high to low in the axilla and momentarily compresses nodes against the lateral chest wall. In a thin patient, one or more normal, mobile lymph nodes less than 1 cm in diameter may commonly be appreciated. T e first lymph node to become involved with breast cancer metastasis (the sentinel node) is nearly always located just behind the midportion of the pectoralis major muscle belly.

After inspection, breast palpation is completed with a woman supine and with one hand above her head to stretch breast tissue across the chest wall (Fig. 1-3). Examination includes breast tissue bounded by the clavicle, sternal border, inframammary crease, and midaxillary line. Breast palpation within this pentagonal area is approached in a linear fashion. Technique uses the finger pads in a continuous rolling, gliding circular motion (Fig. 1-4). At each palpation point, tissues is assessed both superficially and deeply (Fig. 1-5). During CBE, intentional attempts at nipple discharge expression are not required unless a *spontaneous* discharge has been described by the patient.

If abnormal breast findings are noted, they are described by their location in the right or left breast, clock position, distance from the areola, and size. Evaluation and treatment of breast and nipple diseases are described more fully in Chapter 12 (p. 275).

During examination, patients are educated that new axillary or breast masses, noncyclic breast pain, spontaneous nipple discharge, new nipple inversion, and breast skin changes such as dimpling, scaling, ulceration, edema, or erythema should prompt evaluation. T is constitutes breast self-awareness. Patients who desire to perform SBE are counseled on its benefits, limitations, and potential harms and instructed to complete SBE the week after menses.