Nutan Jain
Editor

Complex Total Laparoscopic Hysterectomy (TLH) with Newer Approaches in Bladder Dissection

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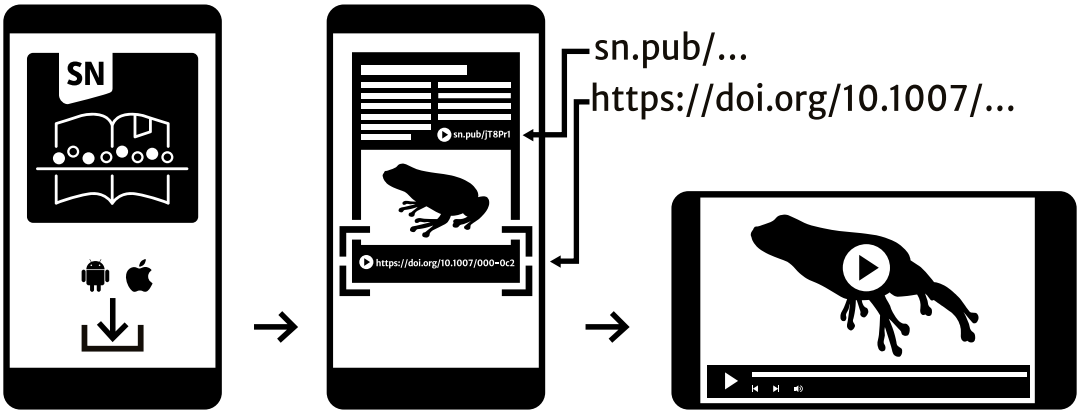

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Complex Total Laparoscopic Hysterectomy (TLH) with Newer Approaches in Bladder Dissection

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ISBN 978-981-97-3225-8 ISBN 978-981-97-3226-5 (eBook)
https://doi.org/10.1007/978-981-97-3226-5

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

This book is a heartfelt dedication to all patients and surgeons navigating the complexities of Total Laparoscopic Hysterectomy (TLH), particularly in the challenging realm of difficult bladder dissection.

Foreword

This new addition, the Canopy Concept, to the laparoscopic hysterectomy forum is really helpful. I like the term and the technique with obvious benefits to simplification of bladder dissection. We have come a long way since before the advent of video laparoscopy, when we had to do extensive operations using our eye attached to the scope optic. This new Canopy Concept continues our goal to eliminate laparotomy in complex total laparoscopic hysterectomy surgery. I always emphasized the posterior cul-de-sac dissection, but here in this book are papers and chapters emphasizing the anterior dissection. Both talk about what I always referred to as loose areolar issue between anterior rectum and post vagina and now this anteriorly bladder dissection from cervix, I like the term, cotton candy appearance and dissection, instead of loose areolar tissue. This dissection looks to be the core basic to creating a good canopy.

Continuingly, the dissections of the ureters is particularly of interest for all gynaecologists for a safe hysterectomy, as suggested, the use of ICG can make it easier. I disagree with transverse closure of the vaginal cuff and believe all vaginal cuffs should be closed vertically incorporating the utero sacral ligaments. That may be something to consider in the future.

In conclusion, all I can say is keep up the good work!

Dallas, Pennsylvania, USA — Harry Reich, MD, FACOG, FRCOG, FACS

Foreword

It is both an honor and a privilege to introduce TLH in Complex Total Laparoscopic Hysterectomy (TLH) with Newer Approaches in Bladder Dissection, authored by the esteemed Dr. Nutan Jain. Dr. Jain's reputation as a pioneer in laparoscopic surgery precedes her, and this volume further cements her legacy as a trailblazer in the field. This book will offer guidance on navigating the complex hysterectomy, with a specific focus on dissecting the anterior compartment, featuring the Comprehensive Canopy Concept: three-step technique. It also delves into the complexities of combining TLH with hernia and gall bladder procedures, offering invaluable guidance for managing such intricate scenarios.

Throughout her distinguished career, Dr. Jain has exemplified an unwavering dedication to advancing the frontiers of surgical innovation. Her relentless pursuit of excellence and exploration of novel techniques have garnered widespread recognition and respect within our medical community.

What distinguishes Dr. Jain's work is not only her technical prowess but also her commitment to improving outcomes. Grounded in a holistic approach to patient care, Dr. Jain ensures that surgical interventions are not only effective but also tailored to the unique individual needs.

I am confident that the knowledge imparted within these pages will equip healthcare providers with the necessary tools to address even the most challenging TLH cases, thereby enhancing clinical outcomes for patients. By sharing her expertise in managing complex scenarios, Dr. Jain empowers us to deliver the highest standard of care, thus advancing the field of complex laparoscopic surgery.

Reflecting on Dr. Jain's extraordinary journey, one cannot help but be inspired by her vision for the future of surgical practice. Driven by an unyielding commitment to excellence, Dr. Jain continues to push the boundaries, serving as a beacon of inspiration for colleagues and mentees alike.

I extend my deepest gratitude to Dr. Nutan Jain for inviting me to contribute to her work. It is my earnest belief that this book will serve as a source of knowledge and inspiration for medical professionals worldwide, propelling us towards a future where the art and science of laparoscopic surgery flourish unabated.

Unidad de Laparoscopia Ginecológica Avanzada y Dolor Pélvico, Pereira, Colombia

Juan Diego Villegas-Echeverri

Foreword

It is with great pleasure and respect that I write this foreword for Dr. Nutan Jain's upcoming book, *Complex Total Laparoscopic Hysterectomy (TLH) with Newer Approaches in Bladder Dissection*. Dr. Jain's work has been instrumental in advancing the field of laparoscopic surgery, and her expertise is evident throughout this comprehensive guide.

Laparoscopic surgery has revolutionized gynecologic procedures, offering patients less invasive options with quicker recovery times and fewer complications. Dr. Jain, with her extensive experience and innovative techniques, has continually pushed the boundaries of what is possible in this field. Her dedication to improving surgical outcomes and educating the next generation of surgeons is truly inspiring.

The content of this book includes pelvic anatomy, different approaches, various clinical case scenarios, and complications. It thoroughly covers all the complex TLH techniques for handling bladder dissection.

Bladder dissection presents significant challenges in complex cases such as those involving previous Cesarean sections or endometriosis. Navigating this part of the procedure while mitigating bladder complications is pivotal for all minimally invasive gynecologic surgeons (MIGS). This book delves into the complexities of TLH, providing detailed insights into the latest approaches in bladder dissection. Dr. Jain's meticulous attention to detail and clear, practical guidance make this an invaluable resource for both novice and experienced surgeons. Each chapter is a testament to her commitment to excellence and her passion for advancing surgical education.

I am confident that readers will find this book not only informative but also transformative in their surgical practice. Dr. Jain's contributions to gynecologic surgery are immense, and this publication reflects her outstanding expertise and unwavering dedication to the field.

I extend my heartfelt congratulations to Dr. Jain on this remarkable achievement and look forward to the positive impact it will undoubtedly have on the practice of laparoscopic surgery.

Warm regards,

Department of Obstetrics and Gynecology
Baylor College of Medicine, Houston, TX, USA

Xiaoming Guan

Foreword

It is a distinct pleasure and privilege to pen a foreword for my esteemed colleague of 30 years, Dr. Nutan Jain, on the publication of her groundbreaking textbook. Her pioneering work in Minimally Invasive Gynecological Surgery has not only revolutionized practices in India but has also earned her recognition on the international stage, including in the United States.

Nutan's contributions extend beyond mere innovation; she has introduced groundbreaking surgical techniques that have become industry standards, such as the widely acclaimed "Jain Point." Her expertise in suturing techniques, particularly in challenging cases like Total Laparoscopic Hysterectomy (TLH) in the presence of fibroids and endometriosis, underscores her commitment to safe and effective surgery. Nutan's pedagogical approach, akin to methods used in fields like American football and aviation, emphasizes hands-on learning through systematic, reproducible steps, ensuring a thorough understanding of critical anatomical principles.

As a patient educator, Nutan goes beyond conventional teaching methods, employing personal demonstrations and video learning to disseminate knowledge effectively. Her Fellowship programs have attracted aspiring gynecologists from around the globe to her learning center in India, further cementing her status as a global leader in the field.

In her comprehensive textbook on Total Laparoscopic Hysterectomy, Nutan not only showcases her mastery of complex cases but also generously shares insights from skilled surgeons worldwide. I extend my heartfelt congratulations to Dr. Nutan Jain on this monumental achievement, which is sure to guide and inspire future generations of gynecological surgeons.

Well done, Nutan!

With warm regards,

Radha Syed, MD, FACOG
Society of Laparoscopic and Robotic Surgery
Staten Island, NY, USA
President, 2024

Foreword

It is with pleasure that I write the forward of this unique textbook written by an authority in the field of laparoscopic surgery. I have known Dr. Nutan Jain for over 15 years as a brilliant minimal-access surgeon and prolific writer with a penchant for demystifying complex surgical conditions. We both play active leadership roles in the American Association of Gynecologic Laparoscopists (AAGL), where she currently serves as a Board member of the urogynecology/vaginal surgery special interest group.

As part of her contributions to knowledge, she introduced the Jain Point, named after her. It has gained widespread popularity and is used as an entry point during complex laparoscopic surgeries and also in situations where Palmer's Point is contraindicated.

Rapid technological and surgical advancements have been made in gynecological minimal-access surgery. Despite this, urologic complications, including bladder injury, remain a significant cause for concern. This textbook takes the reader on a journey to simplify Total Laparoscopic Hysterectomy in the most complex of situations of bladder adherence. Dr. Nutan Jain not only simplifies these complex procedures but also describes Canopy Concept for bladder dissection, reducing complication rates and shortening the procedure duration.

It is indeed a pleasant read.

AAGL Professional Education Committee Member
Medical Director, Gynaescope Specialist Hospital, Nigeria

Jude E. Okohue, MD (Africa)

Preface

Performing Total Laparoscopic Hysterectomy (TLH) in patients with a history of abdominal or pelvic surgery, especially those with dense adhesions from multiple caesarean sections or extensive endometriosis, presents unique challenges. These factors significantly impact the approach, technique, and outcomes of the procedure. Over the years, the global rates of caesarean sections have significantly increased and are projected to continue rising. Patients with previous surgeries pose a higher risk of intraoperative complications during TLH, particularly urinary tract injuries. In such cases, increased operative time, higher blood loss, and a greater likelihood of conversion to open surgery are common, along with an elevated risk of bladder injury exists.

In patients with previous caesarean sections and an adherent bladder, various approaches, both central and lateral, have been attempted to find a plane of bladder dissection, often with persistent difficulties. This challenge prompted us to explore alternative methods for managing the bladder during these hysterectomies. We began performing TLH with a posterior approach and eventually developed the Comprehensive Canopy Concept, which involves addressing the uterine artery before bladder dissection and simplifying the dissection in the utero-vesical space. Though this concept is not new has been by several researchers since very long, the only thing new is our enthusiasm and passion for pushing it further, as earlier it could never achieve the coveted place of being appreciated and accepted by all and kept going into oblivion.

When presenting this technique at conferences and live surgery workshops, particularly in patients with multiple previous surgeries, we initially faced significant opposition. Critics argued that this approach deviated from the conventional anatomical wisdom of performing bladder dissection before addressing the uterine artery. Despite witnessing its effectiveness, skeptics doubted its applicability in more challenging situations. This book aims to dispel such doubts as we have described the TLH approach with the Comprehensive Canopy Concept in virtually all complex situations. We have dedicated years to refining this method, and we urge you to set aside any preconceived notions and give it a try. I assure you that this approach will not only simplify your procedures but also transform your total laparoscopic hysterectomy (TLH) practice. Several authors have contributed their expertise to make this a valuable resource for managing complex TLH scenarios.

Apart from above techniques, in this book we have also included all recent advances like the use of ICG for better delineation of the ureters and use of ICG for Sentinel node mapping in Ca body uterus. A special section has been devoted to making the surgeons adept with the use of cystoscopy and other cystoscopy procedures relevant to complex hysterectomies. Chapter on anesthesia covers the modern technique of "ERAS" for faster recovery. A very relevant section of the book includes tackling the complications of TLH including the fistula repair and vault dehiscence repair. We have made every effort to make this book a one-stop solution for all queries related to complex TLH. Enjoy reading….

Muzaffarnagar, Uttar Pradesh, India — Nutan Jain

Acknowledgement

As I sit to write the acknowledgement for this valuable book on such a complex topic, my heartfelt gratitude extends to my esteemed fellows: Dr. Sakshi Srivastava, Dr. Divyanee Gulati, Dr. Priyanka Sureddi and Dr. Suksham Sharma, and especially my co-director Dr. Vandana Jain. Our dedicated IT team comprises Mr. Pranay Chaudhary, Mr. Vishram Singh, Miss. Asha Rathi, Mr. Deepak Daksh, Mr. Subham Kashyap and Mr. Bhopal Singh. Their immense help and support throughout the creation of this book—from performing deft surgeries, capturing images, and editing videos to crafting the manuscript and ensuring its accuracy—have been invaluable. The commitment and high morale of the team maintained over the past year, along with the readiness of our patients to participate, have made it possible to share these images and videos in a comprehensive textbook cum atlas.

I would also like to extend a profuse thank you to the Springer team, especially Mr. Naren Aggarwal, Ms. Vandana Joshi, Mr. Ejaz Ahmed and Mr. Vishal Anand, for their unwavering support throughout the book's creation. Vandana, in particular, was a constant resource, addressing all our queries and needs during the process.

My heartfelt thanks to all the contributors, especially Dr. Ted Lee, Dr. Suketu Mansuria, Dr. Andrea Tinelli, Dr. Shailesh Puntambekar, Dr. Rooma Sinha, Dr. Pandit Palaskar, Dr. Hrshikesh Pandit, Dr. Shivam Vatsal, Dr. Prateek Gupta, Dr. Sidhartha Gupta and Dr. Aarushi Jain. Their timely submission of manuscripts and images has been instrumental in bringing this project to fruition.

Nothing is possible without a strong backbone. Thanks to my wonderful family for their unique help in the compilation of this book. In the end, I would like to thank my teachers and worthy colleagues who enabled me to reach this point in my career.

It is our collective effort that has resulted in this comprehensive textbook cum atlas, which we believe will serve as a valuable resource for endoscopic surgeons worldwide. Our aim and passion in creating this book is to provide a worthwhile addition to the existing literature and to enhance patient care through improved TLH techniques.

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Editor and Contributors

About the Editor

Nutan Jain an eminent figure in the field of obstetrics and gynecology, completed her MBBS and MD from GSVM Medical College, Kanpur, India. She pursued advanced training in laparoscopy at Texas Medi Tech University, USA, and laparo-hysteroscopy at the Royal Free Hospital, London. Under the mentorship of world-renowned pioneers in endoscopic surgery from the early 1990s, Dr. Jain honed her expertise in minimally invasive techniques.

Currently, Dr. Jain heads the gynecology, IVF, and laparoscopic surgery departments at Vardhman Hospital, Muzaffarnagar, India. Her clinical interests encompass laparoscopic hysterectomy, management of extensive endometriosis, pelvic floor disorders, laparoscopic myomectomy, infertility treatment, IVF, and hysteroscopy. Passionate about education, she has been running highly acclaimed fellowship programs for over two decades, shaping the next generation of specialists in her field.

A prolific contributor to medical literature, Dr. Jain has published numerous papers in peer-reviewed national and international journals and has delivered lectures at prestigious conferences worldwide. She is the author of several books, translated into Spanish and Chinese, extending her knowledge and innovations across the globe. Dr. Jain frequently demonstrates her surgical techniques through live surgeries at workshops, including those organized by the American Association of Gynecologic Laparoscopists (AAGL).

Dr. Jain's notable innovation, the "Jain Point," has significantly advanced the safety of laparoscopic entry for gynecologists and other minimally invasive surgeons, including general surgeons, urologists, oncologists, pediatricians, and bariatric surgeons. Her leadership roles in various international organizations of endoscopic surgery highlight her dedication to the advancement of the field and her impact on surgical practices worldwide.

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Part I

General

Retroperitoneal Anatomy

1

Pandit Palaskar, Prathmesh Zende,
and Madhura Waghmare

1.1 Introduction

The field of anatomy is a systematic study that encompasses observation, conception, and experimentation to gain insights into the workings of the human body. Surgery, on the other hand, represents the pragmatic application of this scientific knowledge to address diseases, excise tumors, alleviate symptoms, and enhance overall function and quality of life. As technology continues to advance, our capacity to visualize and intricately examine structures and organs has grown, leading to a deeper and more refined understanding [1].

Gynaecological malignancies span a wide clinical range, from localized tumors to those displaying aggressive behaviour within the pelvic region, and eventually advancing to extensive metastatic spread throughout the abdomen, lungs, thorax, and, occasionally, the brain. The journey of anatomical education, which commenced with cadaveric studies, has evolved into dynamic lessons conducted in real-time during surgical procedures. The educational evolution has transitioned from traditional open surgery to the modern approach of teaching anatomy through minimally invasive [1]. The latter, offering an amplified view of anatomical structures, stands as one of the most effective mediums for acquiring knowledge and advancing our comprehension of anatomy in the present era.

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1.2 Retroperitoneal Anatomy

The peritoneum, an extensive and intricately organized serous membrane, is thin and transparent, making it the largest of its kind in the body. The section covering the abdominal wall is termed the parietal peritoneum, while the portion enveloping a viscus or organ is referred to as visceral peritoneum. Both types consist of a singular layer of simple, low-cuboidal epithelium known as mesothelium. A fine layer of serous fluid, approximately 50–100 mL, acts as a lubricant, separating and facilitating movement between the parietal and visceral layers of the peritoneum [2].

The posterior abdominal wall acts as the posterior boundary of the abdominal cavity, seamlessly connecting with the posterior thoracic wall from the diaphragmatic level upwards to the posterior pelvic wall downwards. It comprises the lumbar vertebrae, pelvic girdle, and the muscles of the posterior abdominal wall, including the quadratus lumborum, major and minor psoas muscles, iliacus, and the diaphragm, along with their corresponding fascia [3].

Within the abdominal cavity, the retroperitoneum forms a distinct segment, bounded anteriorly by the parietal peritoneum and posteriorly by the transversalis fascia [4].

Extending extensively from the pelvis to the diaphragm, this area encompasses a variety of organs and structures. Structures positioned behind the peritoneum are labeled retroperitoneal (Fig. 1.1).

The primary retroperitoneal organs include the adrenal glands, kidneys, ureters, abdominal aorta, inferior vena cava, and their branches. Conversely, secondary retroperitoneal organs, initially intraperitoneal, experience a positional change during embryological development. This shift occurs as a result of the regression of peritoneal tissue along the posterior wall of the abdominal cavity, causing the mesentery of these structures to fuse with the posterior abdominal wall. The secondary retroperitoneal organs include the ascending and descending colon, the duodenum (excluding the bulbous part or the first half of duodenum segment 1), and the pancreas [3].

N. Jain (ed.), *Complex Total Laparoscopic Hysterectomy (TLH) with Newer Approaches in Bladder Dissection*,
https://doi.org/10.1007/978-981-97-3226-5_1

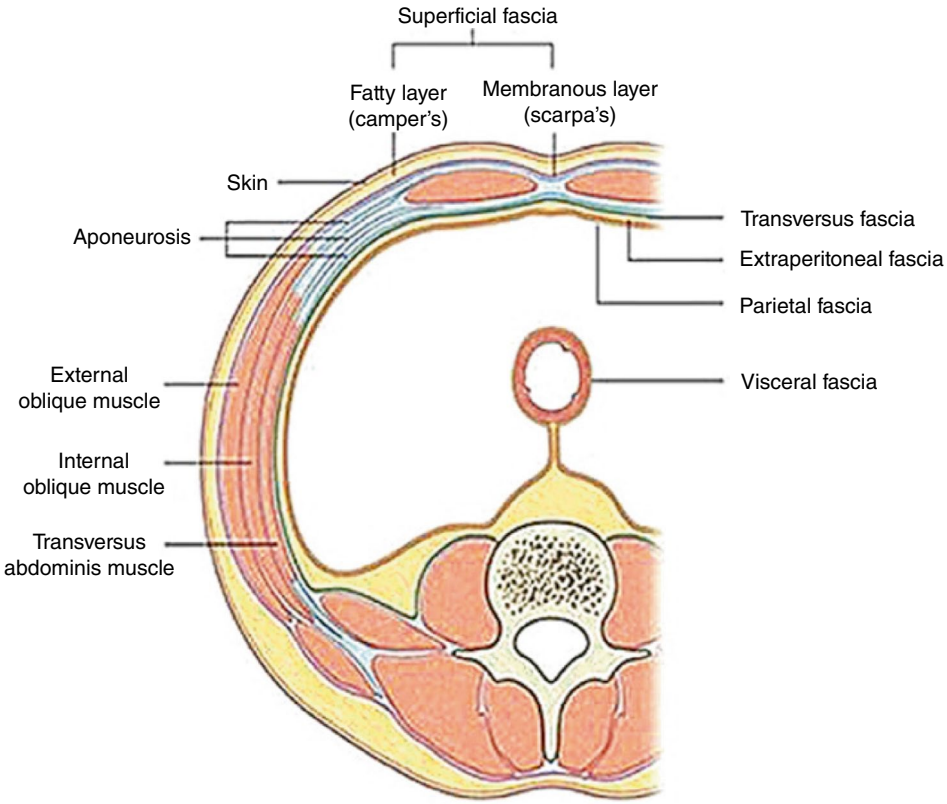

Fig. 1.1 Transverse section of the anterior abdominal wall; the extraperitoneal fascia containing fatty tissue beneath the parietal peritoneum rests against the posterior abdominal wall, known as the retroperitoneum [4]

1.3 The Retroperitoneal Zones

The retroperitoneal space is classified into three zones using anatomico-clinical criteria. This gross classification is beneficial for evaluating organs that might be simultaneously affected by disease or injury due to their close proximity, even if they belong to distinct functional systems [5]. The delineation of these zones, along with their boundaries and contents, is outlined as follows

Zone I (Central)
Upper: Diaphragmatic, esophageal, and aortic openings
Lower: Sacral promontories Lateral: Psoas muscles
Structures included: Abdominal aorta, inferior vena cava, pancreas, duodenum (partial)

Zone II (Lateral, Left and Right Flank)
Upper: Diaphragm
Lower: Iliac crests
Lateral: Psoas muscles
Structures included: Kidneys and their vessels, ureters and their abdominal portions, ascending and descending colon, hepatic and splenic flexure

Zone III (Pelvic)
Anterior: Space of Retzius
Posterior: Sacrum

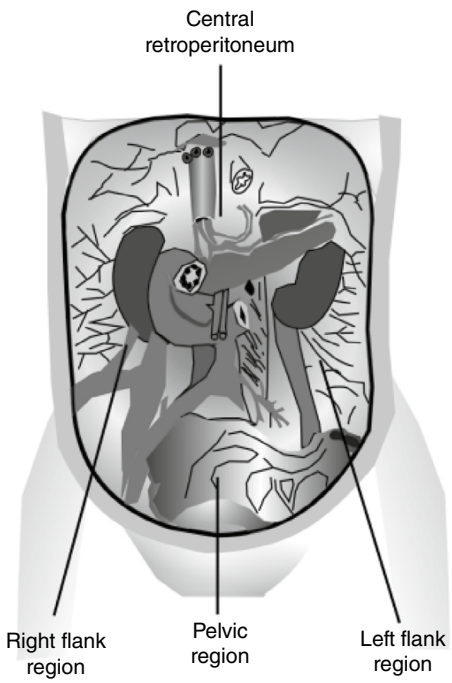

Fig. 1.2 Three zones of the retroperitoneum [6]. (From Ross and Lamperti [11]; with permission)

Lateral: Bony pelvis
Structures included: Entire pelvis, pelvic wall, rectosigmoid colon, iliac vessels, urogenital organs (partial) (Fig. 1.2)

1.4 Compartments of Retroperitoneal Space

The renal fascia delineates three compartments within the retroperitoneal space associated with the kidney.

- Anterior pararenal compartment
- Posterior pararenal compartment
- Perirenal compartment

1.5 Pelvic Vasculature

The sacral promontory, quite literally the pinnacle of the pelvis, serves as a critical anatomical landmark. Pathological conditions affecting the pelvis may extend into the abdomen and beyond, but their origin consistently resides below the sacral promontory. As the most prominent feature in the bony pelvis, the sacral promontory offers a stable reference point for various surgical procedures. It proves especially valuable as a fixed reference in cases where pelvic anatomy appears distorted or marked by scarring. Consequently, any orientation of pelvic structures should begin with identifying the sacral promontory. This anatomical landmark holds significance for several reasons.

At this particular level:

- The common iliac vessels divide into the internal and external iliac vessels.
- The ureter shifts from the lateral to the medial side, passing over the bifurcation of the iliac vessels.
- At this junction, the superior hypogastric nerve plexus, a parasympathetic network, converges to form the left and right hypogastric nerves. The nerve fibers of the plexus are discernible here and, when traced downward, give rise to the hypogastric nerves.

The sacral promontory marks the starting point for transperitoneal para-aortic lymph node dissection. With the sacral promontory as the reference point, meticulous dissection performed laterally to it reveals the pararectal retroperitoneal space. Another method to reach the same landmark involves initiating dissection medial to the infundibulopelvic ligament. This technique, known as the endometriotic approach or the medial approach, is used to access the retroperitoneal space [1].

1.5.1 Arteries

1.5.1.1 Abdominal Aorta

The thoracic aorta is often termed the abdominal aorta due to its passage through the diaphragm into the abdominal cavity. It positions itself anterior to the vertebral column at the posterior abdominal wall. At the L4-L5 vertebra level, the abdominal aorta bifurcates into the right and left common iliac arteries. Subsequently, the common iliac artery further divides into the external and internal iliac arteries at the pelvic brim. Within the pelvic retroperitoneal vasculature, critical structures include the ovarian artery, median sacral artery, external iliac artery, internal iliac artery, and their respective branches (Fig. 1.3).

The ovarian artery is positioned on the anterolateral surface of the abdominal aorta, typically at the L2 vertebra level, approximately 2 cm below the left renal vein. On the left side, it courses over the psoas major muscle and gains entry into the pelvic cavity by crossing the common iliac artery. On the right side, it initially travels over the anterior surface of the inferior vena cava, then descends alongside the

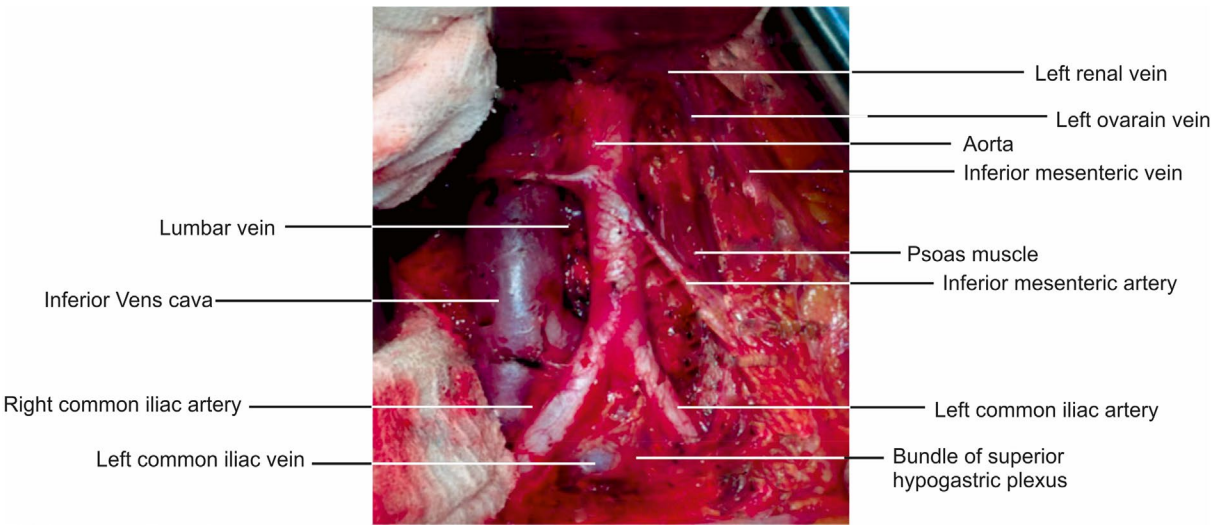

Fig. 1.3 The paraaortic region, aorta, and inferior vena cava following paraaortic lymphadenectomy

ascending colon, approximately 1 cm above the right ureter. It enters the pelvic cavity by crossing either over the common iliac artery or, occasionally, over the external iliac artery.

The median sacral artery is a continuation of the abdominal aorta, tracing the anterior surface of the sacrum and coccyx. It intersects with the left common iliac vein, requiring caution in hysteropexy and colpopexy procedures.

The common iliac artery, dividing into the external and internal iliac arteries, serves as the predominant point for the origin of polar renal arteries. Precise dissection is crucial in surgical interventions within this domain.

The external iliac artery The external iliac artery courses along the medial border of the psoas muscle, extending to the femoral ring below the inguinal ligament. Situated on the lateral border of the external iliac artery, the genitofemoral nerve holds relevance in pelvic lymphadenectomy. Serving as a crucial artery for the lower limb, it branches into the deep circumflex femoral artery and the inferior epigastric artery.

The internal iliac artery courses infero-medially beyond the pelvic brim and acts as the primary vascular supply for the pelvic cavity. It bifurcates into posterior and anterior trunks. The posterior trunk branches into the superior gluteal artery, lateral sacral artery, and iliolumbar artery. The anterior trunk's branches include the umbilical, uterine, superior and inferior vesical, vaginal, obturator, middle rectal, internal pudendal, and inferior gluteal arteries (Fig. 1.4).

The umbilical artery, an end artery of the internal iliac artery's anterior trunk, extends longitudinally to the abdominal wall, eventually transforming into the medial umbilical ligament. Traction on the umbilical artery during laparoscopic procedures serves as an indicator of the uterine artery's origin.

The uterine artery, arising from the anterior trunk, courses medially through the broad ligament (lig. latum uteri) [within the cardinal ligament (lig. transversum cervicis)]. It proceeds toward the isthmic portion of the uterus, supplying blood to the uterus and cervix. Notably, it crosses the ureter in close proximity to the uterus (Fig. 1.5).

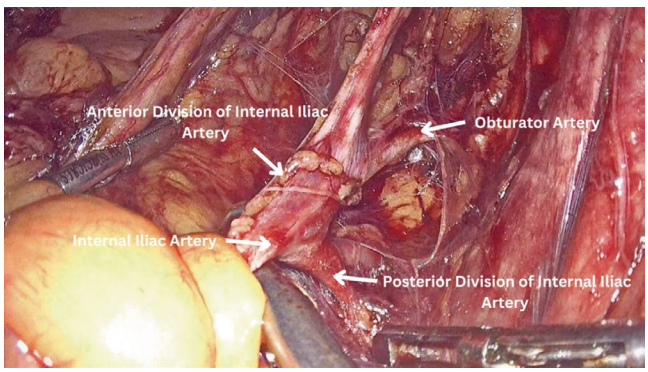

Fig. 1.4 Internal iliac Artery and its branches

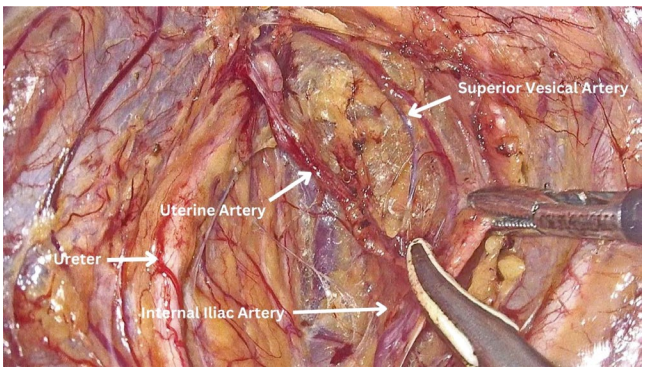

Fig. 1.5 **Anterior** division of internal iliac Artery and branches

1.5.2 Veins

The inferior vena cava (IVC) starts just below the L5 vertebra, aligning with the bifurcation of the common iliac arteries from the abdominal aorta. Below the umbilicus, it sits slightly behind the abdominal aorta. As it ascends, passing over the right psoas major muscle, it stays to the right of the aorta. Beyond the umbilicus, it moves closer to the front of the abdominal aorta.

The external iliac vein extends from the femoral vein above the inguinal ligament, running posteriorly to the external iliac artery.

The pubic vein acts as a vascular connection linking the external iliac/inferior epigastric and obturator veins. Hemorrhage from this vein is referred to as corona mortis and is situated on the posterior aspect of the pubic bone over the obturator fossa. During pelvic lymphadenectomy in gynecologic oncology practice, this area is dissected, and surgeons must exercise caution to prevent hemorrhage from this venous connection.

The internal iliac vein generally runs parallel to its corresponding branches of the internal iliac artery, receiving drainage from various anomalous and collateral veins.

The common iliac vein originates at the confluence point of the internal and external iliac veins, eventually joining its counterpart to form the inferior vena cava.

1.5.3 Nerves

The pelvic structures, such as the uterus, rectum, vagina, and urinary bladder, are innervated by the autonomic nervous system, comprising both motor and sensory sympathetic and parasympathetic nerves. The inferior hypogastric nerve (T10–L2) supplies the sympathetic nerves, while the parasympathetic fibers are contributed by the pelvic splanchnic nerve. These fibers converge to form the inferior hypogastric plexus, supplying both the uterus and the urinary bladder.