Chapter 1

Patient Selection and Assessment for Laparoscopic Urogynaecology

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Introduction

The laparoscopic approach to surgery has revolutionized modern healthcare. With advances in training and accessibility, the worldwide impact of this minimally invasive surgical modality continues to grow exponentially. High quality data continue to show advantages of laparoscopic surgery compared to open surgery in a variety of surgical fields, including lower rates of comorbidity, lower healthcare costs related to length of hospitalization, and expedited patient recovery [1,2,3]. In urogynaecology, laparoscopy can be utilized in the surgical repair of pelvic floor disorders, representing a versatile modality that can address the range from simple to the most complex cases. Adaptation of this modality greatly expands the repertoire of the urogynaecologic surgeon, and simultaneously can expand patient access to quality surgical care. The preoperative, intraoperative, and postoperative care in laparoscopy differs from that of vaginal or open surgery. This chapter will review the nuances of patient assessment and selection in urogynaecologic surgery.

General Approach to Laparoscopic Surgery

Laparoscopic surgery is used to perform abdominal surgery in a minimally invasive fashion. Limitations in laparoscopic surgery are few, particularly in the field of urogynaecology, where surgery is largely elective and non-emergent. Dependent on the skill and comfort level of the surgeon, any abdominal urogynaecologic procedure can be performed laparoscopically. Although, there are a number of factors that must be considered in the patient evaluation prior to performing laparoscopic surgery. This evaluation should be primarily centred around patient safety. Potential risks unique to laparoscopic surgery can be medical or surgical. Thus, the patient assessment must consider both medical comorbidities that increase risk related to the physiologic stressors in laparoscopic surgery, as well as surgical factors that may increase risk of injury.

Physiologic Changes in Laparoscopic Surgery

A number of physiologic changes occur that are inherent to laparoscopic surgery. Consideration of how preexisting medical comorbidities may impact the risk of these changes should be performed in conjunction with the anaesthesiology providers. The majority of intraoperative physiologic changes unique to laparoscopy are related to the synergistic effects of increased intra-abdominal pressure, carbon dioxide absorption, and the Trendelenburg position. While these factors affect patients in a variety of ways, the cardiac, vascular, and pulmonary systems are particularly impacted, placing those with significant cardiopulmonary disease at higher risk.

Cardiac Changes

Cardiovascular function changes during laparoscopic surgery in response to a combination of mechanical and endocrine changes. Upon peritoneal entry and insufflation, a vaso-vagal response resulting in severe bradycardia can rarely occur, requiring immediate release of pneumoperitoneum [4]. Typically, as pneumoperitoneum is established, mechanical pressure on the vasculature results in alterations in venous return, systemic vascular resistance, blood pressure, and cardiac output. Catcholamine release is increased. Carbon dioxide is absorbed trans-peritoneally, resulting in hypercarbia which produces acidosis, altered myocardial contractility, and sensitivity to arrhythmia [5]. Many of these effects are further exacerbated by the Trendelenburg position. In the healthy individual, these cardiovascular changes are readily compensated for, even in prolonged surgeries. Though, caution must be exercised when considering laparoscopic surgery for patients who have significant cardiac risk factors, including those with severe congestive heart failure, cardiac valvular disease, and coronary artery disease.

Pulmonary Changes

Pulmonary changes during laparoscopy also occur in response to the effects of pneumoperitoneum and patient positioning. The head-down positioning in Trendelenburg as well as increased intra-abdominal pressure from insufflation results in cephalad displacement of the diaphragm, causing decreased functional residual capacity, vital capacity, and lung compliance [4]. Extended periods in a steep Trendelenburg position can induce swelling that, when severe, can be obstructive to the airway, requiring prolonged intubation. Additionally the hypercapnic state induced by carbon dioxide absorption requires an increase in minute ventilation. While these changes can be compensated for with ventilation settings in the healthy patient, those with severe pulmonary disease may not be able to tolerate a more extensive laparoscopic surgery. Thus patients with severe asthma, chronic obstructive pulmonary disease, emphysema, pulmonary fibrosis, pulmonary hypertension, and severe obesity should be optimized and carefully considered for laparoscopic surgery. Given that open surgery presents another set of considerable risks in these patients, the implications of needing to convert to laparotomy due to an intolerance to the effects of laparoscopy should be emphasized in these patients.

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Compressive Vascular Changes

Altered intra-abdominal blood flow due to compression from pneumoperitoneum is another potential risk of laparoscopy. Studies have portrayed a decrease in splanchnic blood flow to the liver and intestines, but this is not thought to be clinically significant except for in the critically ill [6]. Similarly, compression of the renal system as well as endocrine effects induced by laparoscopy have been shown to decrease renal perfusion and urine output, though urine output returns to normal shortly after surgery and renal function does not appear to be affected [7].

Neurologic Changes

Elevation in intracranial pressure is another concern during laparoscopy. As a result of the combination of head-down Trendelenburg position, increased intra-abdominal pressure, and hypercarbia, there is a notable increase in intracranial pressure [8]. Fortunately, studies have shown that cerebral blood flow and oxygenation are preserved even in prolonged laparoscopic surgeries. Though, the effects of increased intracranial pressure may be more detrimental in patients with a history of space-occupying intracranial lesions, cerebral aneurysm, and severe carotid atherosclerotic disease.

Surgical Risk Factors

In addition to an evaluation of a patient's baseline medical risk factors, one must also consider surgical risk factors that may alter the risk/benefit ratio of a laparoscopic approach. Intraoperative injuries are most likely to occur in laparoscopic surgery during initial entry, when gaining access to the peritoneal cavity. A thorough surgical history should be taken in every patient, and old operative reports reviewed meticulously. On the abdominal exam, prior scars should always be noted and explained. The prior surgical history should guide the entry location and technique. Consideration should be made to avoid entry at the location of a prior laparotomy or where intra-abdominal mesh has been placed. While individual surgeons prefer different entry techniques, data does not support one technique as clearly superior [9]. Ideally, every surgeon should be comfortable gaining access to the peritoneal cavity using multiple techniques and in multiple locations, in order to plan for the safest entry individualized to the current patient.

In addition to the impact of prior surgeries on the risk during entry, one must consider other factors that add risk to the surgery. Important information would include any history of diffuse peritonitis, extensive bowel surgery, pelvic radiation, known advanced endometriosis, pelvic inflammatory disease, history of intra-abdominal mesh placement, prior urologic surgery, inflammatory bowel disease, and any other history that may suggest a hostile abdomen. While these items rarely provide a true contraindication to laparoscopic surgery, a thorough knowledge and understanding of the individual patient's surgical risk is essential in providing safe and high-quality care.

Activity Restrictions after Laparoscopic Surgery

While laparoscopic surgery is valued for the faster recovery, there is limited consensus on postoperative activity restrictions. One survey of colorectal surgeons who performed both open and laparoscopic surgery revealed significant heterogeneity in their recommendations for activity restriction after surgery to prevent incisional hernia formation [10]. The majority of surgeons did restrict moderate activity for the first two weeks, and intense activity for six weeks postoperatively. Restrictions were significantly stricter after open surgery compared to laparoscopic surgery. In another study of patients who underwent surgery for pelvic organ prolapse, patients were randomized to lifting restrictions of no more than 10 pounds for three months after surgery, versus no restrictions [11]. The unrestricted patients had similar satisfaction scores and anatomic prolapse outcomes, and fewer pelvic floor symptoms Adverse. Outcomes after three months were not reported, nor were those related to incisional hernia. It is important to weigh the risks and benefits of postoperative activity in the individual patient, including the risk of incisional hernia and recurrent pelvic floor disorders, versus the known benefits of early activity. Non-strenuous activity should not be limited after laparoscopic surgery, and if restrictions are given in regards to lifting and other strenuous activity, there is not likely to be any benefit in extending these limitations beyond four to six weeks.

Benefits of Laparoscopic Surgery in Urogynaecology

Laparoscopy versus Open Surgery

Laparoscopy has multiple advantages in urogynaecologic surgery. Compared to the open abdominal approach, the most notable benefits of laparoscopic surgery relate to patient safety and recovery. Population-based data has illustrated this advantageous safety profile when comparing laparoscopic versus open sacrocolpopexy, with the laparoscopic group possessing reduced complication rates, lower blood loss, shorter hospital stay, and lower rates of reoperation and readmission [12]. A number of high quality, randomized controlled trials have demonstrated similar improvements in the safety profile for laparoscopic versus open approach to pelvic organ prolapse repair [13,14]. Furthermore, effectiveness of the surgical repair appears similar between the two approaches. Maher et al [14] published a large review of studies comparing open versus laparoscopic sacrocolpopexy, reporting no difference in the need for repeat prolapse surgery or quality-of-life measures, similar postoperative anterior and apical compartment support, and an improvement in postoperative posterior compartment support with the laparoscopic approach [14]. Similarly, in a systematic review of laparoscopic surgery for stress urinary incontinence, laparoscopic colposuspension had similar efficacy to open colposuspension and vaginal midurethral sling placement, and low rates of adverse events or repeat continence surgery [15]. In regards to cost, laparoscopic sacrocolpopexy is less expensive than the robotic-assisted and open approaches [16,17].

Laparoscopy versus Vaginal Surgery

The potential benefits of laparoscopy compared to vaginal surgery in urogynaecology relate to a more versatile surgical repertoire with a similar safety profile, and some evidence of improved efficacy between analogous procedures. Laparoscopy provides excellent visualization of the entire peritoneal cavity, allowing

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for more advanced surgery in the upper pelvis, if required during urogynaecologic procedures. This is relevant to a number of common scenarios, including the need for hysterectomy for large uterine fibroids, evaluation or removal of ovarian masses, and excision of endometriosis. Laparoscopy is beneficial in patients at risk of adhesive disease given optimal visualization. Even simple procedures, such as opportunistic salpingectomy during hysterectomy, are successfully performed at a much higher rate when performing laparoscopy compared to vaginal surgery [18].

Multiple studies have compared laparoscopic versus vaginal routes of procedures for pelvic organ prolapse [18,19,20,21,22,23,24]. Complication rates are generally similar between the two routes. Although, notably, ureteral obstruction may be lower when performing laparoscopic versus vaginal uterosacral ligament suspension [18]. In regards to prolapse-specific outcomes, some studies report no difference [19,20], while others report an advantage of laparoscopy for either subjective outcomes, anatomic results, or both [18,21,22,23,24]. While definitive conclusions cannot be made regarding the superiority of a laparoscopic compared to vaginal approach to urogynaecologic surgery, this data provokes the question. Prospective, randomized trials with long-term follow-up are needed to compare these two minimally invasive routes of urogynaecologic surgery.

Evaluation of Pelvic Floor Disorders

The preoperative evaluation prior to undergoing surgery for pelvic floor disorders requires a thorough, systematic and global approach. While the majority of laparoscopic urogynaecologic surgery is performed for pelvic organ prolapse, a full assessment must also be made of concurrent urinary incontinence or voiding dysfunction, sexual dysfunction, and defecatory disorders. Given the interrelated nature of various pelvic floor disorders, multiple issues may be addressed concomitantly during surgery if they are appropriately assessed in the preoperative period. Conversely, each of these problems has a variety of other potential aetiologies which must be fully explored to determine how surgery may or may not impact the patient's symptoms.

Vaginal Symptoms of Pelvic Organ Prolapse

The evaluation and treatment of pelvic organ prolapse should be tailored to patient symptoms, and how these symptoms impact quality of life. Symptoms such as vaginal bulge, pelvic pressure, and the feeling that something is dropping are commonly experienced by patients with prolapse. A vaginal bulge that is felt or seen by the patient is one of the most specific symptoms, with positive and negative predictive values for prolapse of >75% [25]. This complaint should elicit a targeted evaluation of further symptoms as well as risk factors for prolapse, including vaginal parity, history of perineal trauma, menopausal status, connective tissue disorders, and family history. Some risk factors are modifiable and can be addressed preventatively, such as obesity and chronic constipation [26].

Voiding Dysfunction and Urinary Incontinence

Symptoms related to voiding dysfunction should be explored thoroughly. The Urinary Distress Inventory, Short Form (UDI-6), is helpful in defining the patient's voiding symptoms as they relate to stress incontinence, overactive bladder, incomplete bladder emptying, and bladder pain. Some urinary symptoms are highly related to pelvic organ prolapse, such as urinary splinting, which has been reported to be >97% specific for anterior vaginal wall prolapse [25]. Others, such as urgency, frequency, and urge urinary incontinence are less specific but commonly seen in patients with prolapse. The evolution of symptoms as they relate to the development of prolapse should be considered. For example, if a patient has improvement in stress urinary incontinence as prolapse worsens, it can be anticipated that this issue will worsen when the prolapse is corrected. Similarly, development of incomplete bladder emptying with worsening of prolapse may likely resolve with correction of the prolapse. Urge incontinence and overactive bladder typically have a more complex aetiology. While often related to prolapse, this is rarely the most significant contributor.

Stress Urinary Incontinence

Symptoms of stress urinary incontinence should always be addressed prior to proceeding with surgery for pelvic organ prolapse, as the problems often coexist. Systematic reviews consistently identify improvement in stress urinary incontinence symptoms when a continence procedure is performed at the time of prolapse repair [27,28]. Patients who do not report symptoms of stress incontinence but then display a positive cough stress test with the prolapse reduced are termed to have de novo stress incontinence. A concomitant continence procedure at the time of prolapse repair is generally beneficial in these patients. In asymptomatic patients with negative testing for de novo stress urinary incontinence, few studies exist looking at a concomitant continence procedure at the time of prolapse surgery. Review of the existing literature in this population has not consistently reported a benefit to a preventative continence procedure, but this is an area that requires further study [27].

Overactive Bladder

Overactive bladder symptoms and incomplete bladder emptying are commonly seen in patients with pelvic organ prolapse. Overactive bladder is a complex syndrome with multiple aetiologies, though it is likely that prolapse does contribute in select patients. While there is some debate over causality, multiple theories exist as to how prolapse might induce bladder overactivity. While the most accepted theory relates to neuromuscular changes induced by prolapse-induced bladder outlet obstruction, others include bladder wall stretch inducing detrusor contraction, as well as opening of the proximal urethra leading to urine entry and subsequent detrusor contraction [29].

In a review of the effects of prolapse surgery on overactive bladder, de Boer et al [29] illustrated significant improvement in both symptoms as well as detrusor overactivity after prolapse surgery in the vast majority of studies [29]. It is likely that these effects are most prominent in patients with evidence of obstruction and incomplete bladder emptying. Given the multifactorial aetiology of overactive bladder, patients should be counselled on appropriate expectations for relief after prolapse surgery. In patients with evidence of obstruction that is relieved with prolapse reduction, some degree of improvement in overactive bladder symptoms may be expected after surgery for prolapse.

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Defecatory Dysfunction

Defecatory dysfunction must be addressed in the presurgical assessment given its prevalence in patients with pelvic organ prolapse. Any symptoms of splinting, stool trapping, incomplete defecation, straining, chronic constipation, as well as fecal incontinence should be assessed. The relationship between defecatory dysfunction and pelvic organ prolapse is complex and not well understood. Obstructed defecation is often linked with a posterior wall defect. In these patients, debate exists as to whether chronic constipation and straining lead to the development of prolapse, or if prolapse is actually the cause for development of obstructed defecation and constipation. While some studies show no correlation between the stage of prolapse and the degree of constipation [30], others consistently report improvement in bowel symptoms after surgery for pelvic organ prolapse [31,32,33,34]. Interestingly, many suggest that surgical repair of the apex may be sufficient to relieve bowel symptoms, regardless of the performance of a posterior colporrhaphy. This improvement is seen across various apical repair techniques, including sacrospinous ligament suspension, uterosacral ligament suspension, and sacrocolpopexy.

Similar to overactive bladder, defecatory dysfunction can be a complex and multifactorial issue. While some patients may experience symptoms purely related to an anatomical defect that may be surgically repaired, a significant number will remain symptomatic after surgical repair. This highlights the importance of a careful and detailed evaluation of bowel symptoms prior to surgery, allowing for a discussion of the expected benefits of surgery between the patient and their physician.

Sexual Dysfunction

In addition to vaginal, bladder, and bowel-specific symptoms, one must evaluate the patient for sexual dysfunction. The relationship of sexual dysfunction with pelvic floor disorders is complex. Evidence does exist supporting a direct relationship between sexual dysfunction with both pelvic organ prolapse and urinary incontinence. Studies have reported an overall improvement in sexual function after surgery for pelvic organ prolapse [35]. Data regarding sexual dysfunction and surgery for urinary incontinence is less consistent; symptoms such as coital incontinence improve with surgery but overall sexual function is more variable [36,37]. A qualitative study on sexual function before and after surgery for pelvic organ prolapse and/or urinary incontinence reported that overall sexual function did improve after surgery, but this improvement was largely due to cure of prolapse and incontinence symptoms, as opposed to behavioural or emotional components. Patients with deterioration of sexual function after surgery attributed this to de novo dyspareunia, fear of causing damage to the surgical repair, new pelvic floor symptoms, and disappointing results of surgery [38]. This highlights the importance of a thorough sexual history and evaluation prior to surgical management of pelvic floor disorders.

Sexual dysfunction may be related to issues with sexual desire, arousal, orgasm, or pain. Patients with pelvic floor disorders including pelvic organ prolapse and urinary incontinence have been shown to be affected in each of these components. In the preoperative assessment before urogynaecologic surgery, if sexual dysfunction does exist, it is critical to determine the aetiology of the problem, and counsel the patient on the likelihood of its relationship to their surgical indication, as well as the expected impact of surgery on their specific symptoms and overall sexual well-being.

Validated Questionnaires for Evaluation of Pelvic Floor Disorders

The symptomatic profile of patients with pelvic floor disorders can be quite complex. Taking a thorough and accurate history can be difficult in these patients given the interwoven relationships between vaginal, urinary, defecatory, and sexual symptoms with pelvic organ prolapse and other pelvic floor disorders. However difficult, this history is of the utmost importance if a patient is considering undergoing an elective surgical procedure to address these issues. Their quality of life and personal goals of care must be well-understood by the physician to provide the best possible pre-surgical counselling and care. A large number of symptom- and quality-of-life-specific questionnaires exist to guide this evaluation. In 2020, the Pelvic Floor Disorder Consortium, which is an international, multidisciplinary organization of urogynaecologists, colorectal surgeons, gynaecologists, urologists, gastroenterologists, and physiotherapists, collaborated to determine the best available validated tools to utilize in the initial comprehensive evaluation of urogynaecologic patients. The final collection of validated assessment tools was combined to create the Initial Measurement of Patient-Reported Pelvic Floor Complaints Tool (IMPACT) [39]. This tool is meant for use in both women and men, and addresses the spectrum of pelvic floor disorders. The questionnaires included in this tool are summarized in Table 1.1.

Of course, in addition to a targeted urogynaecologic history, one should elicit a comprehensive history including any other gynaecologic, urologic, obstetric, medical, and surgical issues that the patient may endorse. All deliveries should be investigated, including the method of delivery, degree of perineal trauma, and any relevant complications. Medical comorbidities that may worsen pelvic floor disorders should be evaluated, such as diabetes mellitus, history of stroke or other neurologic disease, musculoskeletal issues, and pulmonary conditions causing chronic cough. The surgical history should include precise details regarding history of hysterectomy or any other pelvic surgery, pelvic radiation, abdominal surgery, and any prior surgical implants such as mesh.

Physical Evaluation of the Urogynaecologic Patient

Every patient being evaluated for surgery should undergo a similarly comprehensive physical exam. Prior to urogynaecologic surgery, this exam should focus on the abdomen, pelvis, musculoskeletal, and neurologic systems. All medical comorbidities discovered during the patient assessment should be addressed as appropriate on the physical exam. Depending on the severity of the comorbidity and the extent of the planned surgery, perioperative care of medical comorbidities should be shared with the anaesthesiology and perioperative medicine teams.

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Table 1.1 Validated questionnaires recommended by the Pelvic Floor Disorders Consortium (adapted from [39])

Questionnaire	Focus	Original author	Description
Pelvic Floor Distress Inventory, Short Form (PFDI-20)	Quality of life	Barber	20 questions, quantification of degree of bother related to bowel symptoms, bladder dysfunction, and pelvic organ prolapse
Urogenital Distress Inventory (UDI-6)	Urinary incontinence	Lemack	6 questions, identifies type of urinary incontinence, type and severity of symptoms, and degree of bother
ICIQ-Female Lower Urinary Tract Symptom Questionnaire Short Form (ICIQ-FLUTS)	Lower urinary tract symptoms	Brookes	25 questions, identifies type and degree of lower urinary tract symptoms, and quality of life
Pelvic Organ Prolapse/Incontinence Sexual Questionnaire, IUGA-Revised (PISQ-IR)	Sexual function	Rogers	21 questions if sexually active, 12 if sexually inactive, identifies sexual dysfunction and inactivity in women with pelvic floor disorders
Patient Assessment of Constipation-Symptoms (PAC-SYM)	Constipation	Frank	12 and 16 questions, assesses severity of the various subsets of constipation (obstructed defecation, slow transit, irritable bowel syndrome)
Constipation Severity Instrument (CSI)	Constipation	Varma	
Cleveland Clinic Florida Incontinence Scale (CCFIS)	Faecal incontinence	Jorge, Wexner	5 and 7 questions, assesses severity of fecal incontinence, as well as the impact of urgency and constipating medications on the level of severity
St Marks Incontinence Score (MIS)	Faecal incontinence	Vaizey	

Targeted Exam for Pelvic Floor Disorders

The physical exam specific to pelvic floor disorders should generally include an evaluation of the vagina, bladder, urethra, rectum, vulva and surrounding integumentary, as well as the neurologic and musculoskeletal support of the pelvic floor [40] (Table 1.2 summarizes the steps of the exam). First an external exam should be performed, ideally with the patient in the lithotomy position. Any evidence of urinary or faecal soiling, skin irritation or breakdown, or tissue discolouration should be noted. Superficial sensation can be assessed. Severe prolapse may be noted at this time as well. The labia are then separated and an evaluation of the labia minora and clitoral anatomy, vestibule, perineal body, and urethral meatus can be performed. Evidence of hypoestrogenism should be noted. The patient should be asked to Valsalva and cough vigorously; with attention paid to evidence of stress urinary incontinence (cough stress test), proximal urethral mobility, perineal body protrusion, and vaginal prolapse. Historically, a cotton swab was placed in the urethra to measure mobility of the urethral axis, but this is no longer practised given its lack of utility and patient discomfort. The genital hiatus and perineal body are measured for the pelvic organ prolapse quantification (POP-Q) examination.

A sims retractor, or one speculum blade, should then be inserted into the vagina to assess the different compartments individually. With the posterior vagina retracted inferiorly, one can examine the urethra, bladder neck, bladder, and anterior vaginal wall. The patient should be asked to Valsalva, and the extent of anterior compartment prolapse should be measured in relation to the hymen. At this time a discrimination may also be made between central cystocele versus paravaginal defect. As described by Walters, this distinction can be made by placing a forceps in the lateral vaginal sulcus with pressure toward the ischial spine [40]. If support of a flattened or bulging lateral sulci improves the anterior prolapse, then there is presumed to be a paravaginal defect. If the anterior prolapse is unchanged with this support, it is likely due to a central cystocele without a paravaginal defect.

The retractor is then used to depress the anterior vaginal wall in order to assess the posterior compartment. With Valsalva, the extent of posterior wall prolapse should be measured in relation to the hymen. Descent of the perineal body can be assessed. A digital rectal exam at this time may be useful in delineating a rectocele versus enterocele. A full speculum may then be inserted for visualization of the cervix, and evaluation of the remaining POP-Q measurements (points C and D of the vaginal apex, and the total vaginal length).

Bimanual pelvic exam should then be performed. Attention should first be paid to uterine size, position, mass, and tenderness, as well as adnexal masses/fullness or pain. An assessment of pain or tenderness over the bladder and urethra should be made by palpation. The pelvic floor muscles are then evaluated, taking note of any evidence of muscle tenderness, tightening, or shortening. This aspect of the exam is purposefully performed at the end of the vaginal portion, as it may exacerbate patient discomfort if they have myofascial pain. An effort should be made to determine which muscles specifically are affected. Pelvic floor squeeze, or Kegel, is then assessed. Strength should be graded between 0 and 5 [40]. Digital rectal exam is then performed, with attention to any masses, resting tone, and the structure and strength of external anal sphincter with squeeze. Presence of rectal mucosal prolapse, haemorrhoids, or fissure should be noted.

Additional Evaluation

In addition to the traditional history and physical exam, a number of other analyses may be useful in the evaluation of pelvic floor disorders. Common examples include urinalysis and

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Table 1.2 Comprehensive physical examination for pelvic floor disorders

Examination component	Action required	Evaluation for
External inspection	▪ Visually and superficially inspect integumentary of perineum and vulva	▪ Evidence of urinary or faecal soiling ▪ Skin discolouration, irritation, breakdown ▪ Hypoestrogenism ▪ Loss of vulvar architecture ▪ Severe vaginal or rectal prolapse ▪ Superficial sensation ▪ Vulvodynia
Superficial vaginal exam	▪ Spread labia minora to inspect urethral meatus, vestibule ▪ Perform with and without Valsalva	▪ Epithelial discolouration ▪ Loss of architecture at labia minora or clitoris ▪ Hypoestrogenism ▪ Vestibulodynia ▪ Urethral discharge, mass, prolapse ▪ Cough stress test ▪ Perineal body protrusion or descent ▪ POP-Q points PB, GH
Anterior compartment exam	▪ Retract posterior vaginal wall with Sims retractor or single speculum blade ▪ Perform with and without Valsalva	▪ Periurethral masses ▪ Proximal urethral mobility ▪ Anterior compartment prolapse ▪ Paravaginal defect versus central cystocele ▪ Prolapse of vaginal apex ▪ POP-Q points Aa, Ba, C
Posterior compartment exam	▪ Retract posterior vaginal wall in similar fashion ▪ Perform with and without Valsalva	▪ Posterior compartment prolapse ▪ Descent of perineal body ▪ POP-Q points Ap, Bp ▪ Evaluation of perineal thinning, rectocele versus enterocele (may require rectovaginal exam)
Speculum exam	▪ Insert full speculum	▪ Epithelial discolouration ▪ Cervical pathology ▪ Cervical length ▪ POP-Q point TVL
Bimanual exam	• Digital bimanual pelvic exam • Perform with and without squeeze	▪ POP-Q points C and D ▪ Uterine size, position, tenderness, masses ▪ Posterior culdesac pain ▪ Rectovaginal nodularity ▪ Adnexal fullness, masses, or pain ▪ Bladder or urethral tenderness ▪ Squeeze strength (Kegel) ▪ Pelvic floor muscle tenderness or shortening
Digital rectal exam	• External and internal rectal exam • Perform with and without squeeze	▪ External anal sphincter appearance with squeeze ▪ Anal sphincter tone at rest and with squeeze ▪ External anal sphincter defects ▪ Rectal prolapse ▪ Haemorrhoids or anal fissures

*POP-Q point definitions:

Aa: 3 cm proximal to the hymen on anterior wall

Ba: most distal point of any part of anterior wall between Aa and anterior fornix (or C if no cervix)

C: most distal point of the cervix or vaginal cuff

D: point of the posterior fornix in patients with a cervix

Ap: 3 cm proximal to the hymen on posterior wall

Bp: most distal point of any part of the posterior wall between Ap and posterior fornix (or C if no cervix)

TVL: measurement of total vaginal length

GH: measurement from urethral meatus to posterior margin of the hymen

PB: measurement from posterior margin of the hymen to mid-anal opening

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possible culture, measurement of post-void residual volume, voiding diaries, and validated questionnaires (see Table 1.1). Urodynamic testing, cystourethroscopy, pelvic ultrasound, anorectal manometry, and endoanal ultrasound are useful in specific situations, but are not employed as part of the routine exam. Other technology such as trans-perineal ultrasound and functional MRI are actively providing a deeper understanding of pelvic floor disorders, and their utility in clinical practice continues to be an interesting line of research.

While the use of these various testing modalities varies in clinical practice, the National Institute for Health and Care Excellence (NICE) provides evidence-based recommendations for the initial evaluation of pelvic floor disorders [41]. Urinalysis is recommended for all patients with symptoms related to urinary tract infection or incontinence. Post-void residual volume is recommended for all patients at risk of voiding dysfunction or recurrent urinary tract infection, preferably by bladder scan ultrasound as opposed to catheterization. A voiding diary detailing fluid intake, urinary symptoms, and voiding volume/frequency over at least three days is recommended in all patients with symptoms of urinary incontinence or overactive bladder. Validated questionnaires should be used routinely. Urodynamic testing does not need to be performed prior to surgery for stress urinary incontinence if the patient has pure stress incontinence or stress-predominant mixed incontinence, and demonstrates stress incontinence on exam. Though, urodynamic testing should be performed if any complicating factors exist, including anterior or apical prolapse, symptoms of voiding dysfunction, urge-predominant symptoms, or prior incontinence surgery. This recommendation is consistent with data from the Value trial, though a more comprehensive review of the utility of urodynamic testing is beyond the scope of this chapter [42].

Informed Consent

The final component of patient selection and assessment is the informed consent process. In the field of urogynaecology, this process is quite complex and nuanced. The impact of pelvic floor disorders is unequivocally dependent on patient symptoms and their impact on quality of life. Surgery is rarely an absolute necessity. A host of options exists in the management of the various pelvic floor disorders, ranging from expectant management, to conservative treatments, to a number of surgical procedures. The surgical procedures themselves vary considerably in efficacy, invasiveness, and other related outcomes. As opposed to extirpative surgery, urogynaecologic procedures are reconstructive, which places an emphasis on patient-centered outcomes and complicates the informed consent process.

The centre of any informed consent discussion in urogynaecology should be the patient's goals of care. After the decision is made to proceed with surgical care, the patient and their physician should have a clear and detailed discussion that combines their goals and priorities with the expected benefits and potential risks of the various surgical options available to them. Below is a brief description of commonly performed laparoscopic procedures in urogynaecology. Later chapters provide more extensive reviews of the surgical details and data behind each procedure.

Laparoscopic Sacrocolpopexy

In laparoscopic sacrocolpopexy, the surgeon supports the prolapsing pelvic organs by fixing a graft from the vagina to the anterior longitudinal ligament near the sacral promontory. The vaginal attachment may be to the vaginal vault in a patient who has had a hysterectomy, immediately after the performance of hysterectomy, or in a uterine-sparing fashion, as in the case of sacrohysteropexy. Graft material is most commonly a synthetic, non-absorbable mesh material, but biologic materials can be used. Vaginal graft placement varies. The mesh is typically attached to the anterior vagina, apex, and posterior vagina, though it can also be attached to the perineal body as in sacrocolpoperineopexy, or the rectal wall and pelvic floor muscles as in rectopexy. Historically considered by some to be the gold standard of surgery for pelvic organ prolapse, open abdominal sacrocolpopexy is significantly more invasive than the traditional vaginal procedures for prolapse. Though with the advent of laparoscopy, abdominal sacrocolpopexy can be performed in a minimally invasive fashion with a risk profile similar to vaginal surgery. Compared to the open approach, laparoscopic sacrocolpopexy is associated with lower rates of adverse events, shorter hospital stay, and longer operative time, with similar anatomic results [43]. In a meta-analysis comparing mesh sacrocolpopexy to native tissue vaginal procedures for apical pelvic organ prolapse, sacrocolpopexy was associated with improved anatomic outcomes, similar symptomatic improvement, and potentially higher rates of adverse events [44].

Laparoscopic Uterosacral Ligament Suspension

In laparoscopic uterosacral ligament suspension, the surgeon affixes the vagina to the proximal uterosacral ligaments, in a fashion analogous to the tradition vaginal uterosacral ligament suspension. The suture material used may be either permanent or delayed-absorbable. This procedure may be performed at the time of hysterectomy using the vaginal cuff, in the setting of remote hysterectomy by using the vaginal apex, or in a uterine-sparing fashion. Laparoscopic uterosacral ligament suspension has been compared in a retrospective fashion to the vaginal approach, with varying results. While adverse events are generally equivalent, ureteral obstruction may be lower with the laparoscopic approach [18], and may be completely avoidable as long as the ureter is visualized. For prolapse outcomes, some studies report no difference [19,20], while others report an advantage to the laparoscopic approach in regards to anatomic results [21,23] and prolapse symptoms [18,22]. Though, conclusions of these retrospective studies are quite limited and prospective randomized studies are needed to accurately compare these two operations.

Laparoscopic Moschcowitz and Halban

Both laparoscopic Moschcowitz and Halban procedures are performed in an analogous fashion to the abdominal approach, and are best used as an adjunct to a different primary procedure. In the Moschcowitz procedure, a non-absorbable suture is placed circumferentially in a purse-string fashion through the peritoneum of the posterior culdesac, obliterating this space

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between the posterior vagina and the serosa of the rectosigmoid colon. The Halban procedure is performed by using a series of interrupted sutures from the posterior vagina to the rectosigmoid serosa. Both of these procedures intend to treat or prevent enterocele, and are not performed as a singular operation to treat pelvic organ prolapse.

Laparoscopic Paravaginal Repair

During a laparoscopic paravaginal repair, the retropubic space is entered and dissected until the pubic symphysis, Cooper's ligaments, and the bladder neck are identified. Laterally, the obturator internus muscle, obturator foramen, and arcus tendineus fasciae pelvis are identified. The lateral vagina is affixed to the arcus tendinous fasciae pelvis using four to six stitches, starting at the level of the ischial spine and moving distally, with care to avoid the bladder neck. The efficacy of paravaginal repair has been debated. While some suggest that a paravaginal repair for treatment of a cystocele provides a more appropriate restoration of anatomy without compromising vaginal length, others argue that a vaginal approach is more appropriate as an isolated operation. In regards to apical prolapse, data is mixed, with some studies showing no difference when paravaginal repair is added to laparoscopic sacrocolpopexy or uterosacral suspension, and others touting low recurrence rates and low adverse events when the procedures are combined [45,46]. This remains an area in need of further research.

Laparoscopic Pectopexy

Laparoscopic pectopexy is a relatively new approach to the repair of pelvic organ prolapse. In this procedure, the surgeon enters the retropubic space and dissects down to identify Cooper's ligament (pectineal ligament). Permanent sutures affix a synthetic mesh from the ligament to either the anterior vaginal cuff, cervical stump, or anterior vagina and cervix in the case of hysteropexy. This procedure has been compared to vaginal sacrospinous ligament suspension [47] and laparoscopic sacropexy [48], with similar results related to anatomical outcomes and patient satisfaction, but potential advantages of pectopexy in regards to sexual and defecatory function. Conclusions cannot be made on the outcomes of this procedure given a paucity of data, but the available studies are encouraging and suggest more research is warranted.

Laparoscopic Uterine-Sparing Procedures for Prolapse

Recently, uterine-sparing procedures have been more commonly offered and performed during the surgical treatment of pelvic organ prolapse. A number of laparoscopic procedures for prolapse can be modified to perform as a uterine-sparing procedure, or hysteropexy. Common laparoscopic hysteropexy procedures include sacrohysteropexy, uterosacral hysteropexy, and pectohysteropexy. In a recent systematic review, when compared to sacrocolpopexy, sacrohysteropexy outcomes are similar in regards to prolapse recurrence, while reducing mesh exposure, operative time, blood loss, and surgical cost [49]. Compared to vaginal hysterectomy with uterosacral ligament suspension, mesh sacrohysteropexy was also associated with improvements in the C-point and total vaginal length. These outcomes are promising and suggest that uterine-sparing options should be offered to patients during counselling for pelvic organ prolapse surgery. Though, the benefits must be weighed against unknown long-term outcomes, as well as the future risk of uterine pathology after hysteropexy.

Laparoscopic Burch Urethropexy

Laparoscopic Burch urethropexy is the primary laparoscopic procedure for stress urinary incontinence. In this procedure, the surgeon enters the retropubic space, and dissects down to identify the pubic symphysis, Cooper's ligament, and the bladder neck. One to two non-absorbable stitches are placed lateral to the midurethra and bladder neck, and affixed to Cooper's ligament, using a vaginal hand for assistance in identifying the appropriate amount of bladder neck elevation. This procedure has become less common with the advent of vaginal midurethral synthetic slings. Though, given the current climate surrounding mesh use in urogynaecology, some surmise that laparoscopic colposuspension will become more commonly performed in the future. A recent systematic review supported this possibility, noting minimal differences in patient outcomes between laparoscopic Burch urethropexy when compared to either open Burch or midurethral synthetic sling [15].

Conclusion

The laparoscopic approach to urogynaecologic surgery is a rapidly evolving, contemporary approach to the treatment of pelvic floor disorders. While traditional open abdominal and vaginal procedures are more well-studied, the benefits of laparoscopy can be significant, including improved patient safety and recovery parameters, potential advantages in surgical efficacy, and the ability to perform increasingly complex surgical procedures. The basic principles of preoperative surgical assessment should be maintained in these patients, and the general nuances of risks in laparoscopic surgery should be considered. The evaluation of urogynaecologic patients should be thorough and systematic, acknowledging the complex interactions that occur amongst pelvic floor disorders, with a constant focus on improving quality of life. With the continued increase in accessibility and training in laparoscopic surgery, an increasing number of surgeons will possess the skills to improve the lives of urogynaecologic patients.

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