

## Urogynecological examination and simulated operations within the Integral Theory framework; a narrative review

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### ABSTRACT

Pelvic floor dysfunction is commonly assessed using symptom-based classification and static anatomical examination; however, the relationship between pelvic floor anatomy and symptom generation is often complex. Within this context, the Integral Theory offers a functional and compartment-based framework that relates pelvic floor symptoms to defects in specific ligamentous and fascial supports. A central component of this approach is the concept of the simulated operation, in which temporary mechanical support is applied to a suspected anatomical defect to determine whether symptoms improve. This review summarizes the principles of urogynecological examination within the Integral Theory framework, with emphasis on the three vaginal zones, their associated symptom patterns, and the clinical role of simulated operations in the anterior, middle, and posterior compartments. Particular attention is given to the practical value of these maneuvers as dynamic bedside tests that help link symptoms to compartment-specific support failure. The review also discusses their relevance in contemporary urogynecological practice, especially in women with complex, overlapping, or disproportionate symptoms, as well as their limitations, including examiner dependence and subjective symptom interpretation. Simulated operations should not be viewed as stand-alone diagnostic tools, but as clinically useful adjuncts that complement history, examination, imaging, and other investigations. Within a structured diagnostic pathway, they may refine clinical reasoning, support compartment-specific management, and strengthen the functional correlation between anatomy and symptom expression.

**Keywords:** Integral Theory, urogynecological examination, simulated operation, stress urinary incontinence, posterior fornix syndrome

### INTRODUCTION

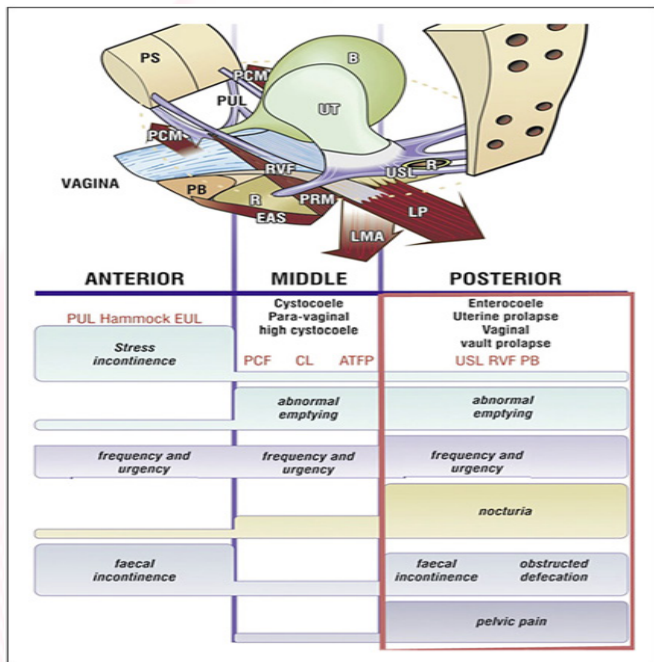
Pelvic floor dysfunction is traditionally approached through symptom-based classification and static anatomical assessment. However, many urogynecological symptoms overlap, and the relationship between anatomy and symptom generation is not always straightforward.<sup>1</sup> Within this context, the Integral Theory<sup>2</sup> proposed a compartment-based and functional interpretation of pelvic floor disorders, emphasizing the role of connective tissue laxity, ligamentous support, and dynamic muscle action in maintaining normal pelvic organ function.<sup>3</sup> In this model, dysfunction is not viewed solely as an organ-specific disorder, but as the consequence of disturbed interactions between pelvic organs, their supporting ligaments and fascia, and the reflex muscle forces acting upon them.

A central concept of the Integral Theory is that connective tissue damage may be assessed within three vaginal zones (**Figure 1**) which form the basis of its diagnostic system, surgical anatomy, and treatment strategy. This zonal approach was developed to correlate characteristic symptom complexes with defects in specific anatomical supports and to guide

targeted reconstructive procedures. Rather than relying only on static findings, the theory frames pelvic floor assessment as a dynamic clinical process in which structure and function must be interpreted together.

An important diagnostic extension of this framework is the concept of the simulated operation. In the Integral Theory system, simulated operations are used to verify the suspected zone of anatomical damage by temporarily restoring support and observing whether symptoms improve. Petros<sup>3</sup> describes this method as a valuable part of the diagnostic pathway because it allows preoperative direct testing of symptom causation. In this sense, simulated operations are not merely examination maneuvers; they are functional bedside tests designed to connect anatomy with symptom expression.

The aim of this review is to summarize the principles of urogynecological examination within the Integral Theory framework, with particular emphasis on the anatomical basis of the three vaginal zones, the rationale and technique of simulated operations, their clinical interpretation, and their



**Figure 1.** Pictorial diagnostic algorithm.<sup>3</sup> This algorithm correlates pelvic floor symptoms with the ligaments most likely to be damaged. Each symptom is marked in the relevant box, allowing the associated ligament defect and prolapse pattern to be identified.

PUL: Pubourethral ligament, suburethral hammock. EUL: External urethral ligament, CL: Cardinal ligament, PCF: Pubocervical fascia, ATFP: Arcus tendineus fascia pelvis, RVF: Rectovaginal fascia, USL: Uterosacral ligament

potential value in linking pelvic floor symptoms to specific compartmental defects.

### THE THREE VAGINAL ZONES AND THEIR SYMPTOM ASSOCIATIONS

Within the Integral Theory framework, the connective tissue structures responsible for pelvic organ support and symptom generation are organized into three functional vaginal zones: anterior, middle, and posterior. This zonal classification forms the basis of the pictorial diagnostic algorithm, in which symptoms are used to predict the most likely site of connective tissue damage and the associated prolapse pattern. Rather than viewing prolapse and pelvic floor symptoms as separate entities, this approach links specific symptom complexes to defects in particular ligamentous and fascial supports.

The anterior zone extends from the external urethral meatus to the bladder neck and is mainly associated with the pubourethral ligament and suburethral hammock. Defects in this zone are classically linked to stress urinary incontinence, reflecting impaired urethral support during increases in intra-abdominal pressure.<sup>3</sup>

The middle zone extends from the bladder neck to the anterior cervical ring and includes structures such as the pubocervical fascia, cardinal ligament, and arcus tendineus fascia pelvis. Damage in this compartment may contribute to cystocele-related dysfunction and may also be associated with storage symptoms, depending on the pattern and extent of support failure.<sup>3</sup>

The posterior zone extends from the posterior cervical ring to the perineal body and is closely related to the uterosacral ligaments and rectovaginal fascia.

An important strength of this zonal model is that it provides a practical bridge between anatomy and symptoms. Although overlap between compartments is common, the algorithm

offers a structured way to interpret symptom patterns during urogynecological examination and may help guide both diagnostic maneuvers and compartment-specific reconstructive strategies.

Within the Integral Theory framework,<sup>2</sup> simulated operations are used as dynamic clinical maneuvers to verify the suspected site of connective tissue damage. Rather than relying solely on static examination findings, they aim to temporarily restore support to a suspected anatomical defect and observe whether symptoms improve.

The rationale for these maneuvers lies in the dynamic nature of symptom formation. According to the Integral Theory, symptoms do not arise simply from visible prolapse, but from altered interactions among connective tissue, muscles, and sensory nerves.<sup>4</sup> As a result, even minor anatomical defects may produce major symptoms, and the full extent of structural weakness may not always be obvious on routine examination.

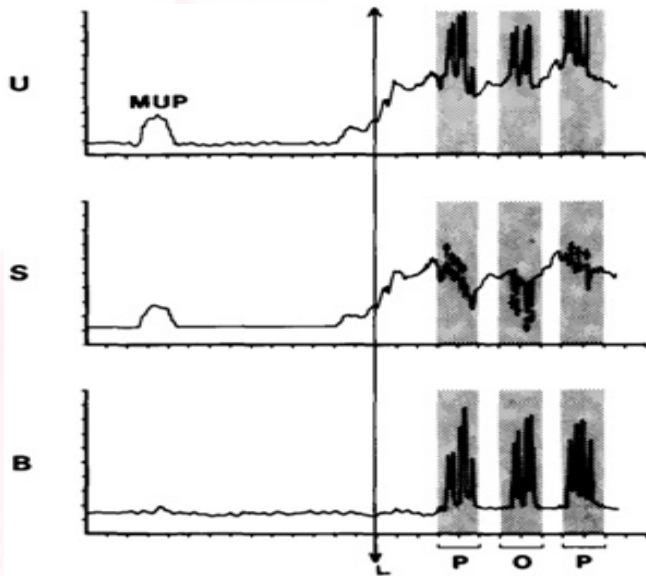
Different simulated operations may be performed according to the compartment suspected to be involved. In women with anterior zone dysfunction, temporary support of the midurethra or bladder neck may help clarify the anatomical contribution to stress urinary incontinence. In contrast, in patients with posterior compartment symptoms, mechanical support of the vaginal apex or posterior fornix with a speculum, tampon, forceps, or similar maneuver may be more informative. These techniques are intended to mimic the effect of restoring ligamentous support and to determine whether symptom relief can be achieved during examination.

### SIMULATED OPERATIONS IN THE ANTERIOR COMPARTMENT

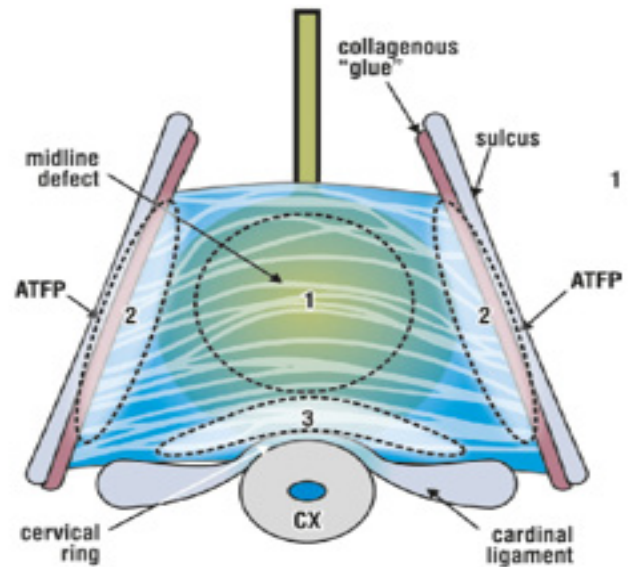
In the anterior compartment, the aim of the simulated operation is primarily to assess the contribution of the pubourethral ligament and related suburethral support structures to stress urinary incontinence. Petros<sup>3</sup> describes this test as being performed with the bladder full, by applying the tip of a finger or an artery forceps unilaterally immediately behind the pubic bone at the site of the pubourethral ligament while the patient coughs. If urine loss is reduced or abolished, the finding supports the view that defective anterior support is contributing to the symptom. This maneuver may also relieve urgency in some women with mixed incontinence and may suppress cough-activated detrusor instability.<sup>5</sup>

A related anterior compartment maneuver is the pinch test (Figure 2) in which a unilateral fold of vaginal epithelium is grasped to simulate tightening of the suburethral hammock. Petros<sup>2</sup> notes that this test may completely control stress leakage in a proportion of patients, thereby emphasizing the importance of adequate hammock support for continence. In some women, simultaneous support of both the pubourethral ligament and the hammock almost completely abolishes leakage during coughing, suggesting that combined restoration of these structures may be relevant when planning anterior compartment reconstruction.

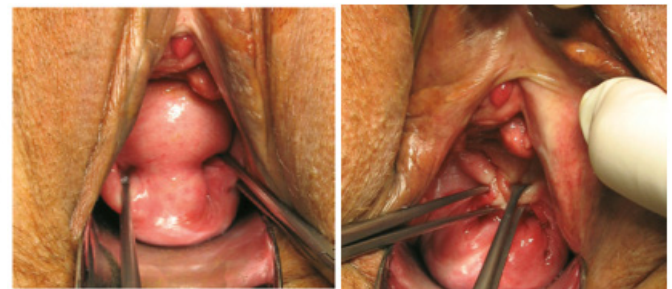
The clinical value of anterior compartment simulated operations lies in their ability to convert a static examination into a dynamic functional assessment.<sup>7</sup> Rather than identifying only anatomical laxity, the examiner can directly observe whether restoration of support modifies leakage or urgency. In this way, the test helps connect symptom



**Figure 2.** “U” indicates the pressure measured in the urethra. “B” indicates the simultaneous pressure measured in the bladder. And “S” indicates the electronically subtracted pressure “U” minus “B”. The maximal urethral pressure (MUP) is indicated on the left side of the upper diagram, as measured by a mechanically withdrawn transducer. The transducer was then manually positioned at approximately the mid-urethral point, and the vagina tightened by application of forceps to one side of the urethra approximately one cm proximal to the urethrovesical junction. Compression of vagina was commenced at the vertical line L. Note the increase in MUP on application of the “pinch” just to the right of the vertical line. This may be attributed to more efficient contraction of the slow twitch muscles. The shaded areas indicate application of the “pinch” (P) to the vagina during coughing, release of “pinch” (O), pinch “(again reapplication of “pinch (P). The ratio between the spikes at U and B is the cough transmission ratio (CTR). We attribute the CTR to contraction of the fast twitch muscles. The- “Pinch CTR” is best seen in the subtractor channel, “S” where positive spikes are shown at P, then negative spikes at O, followed again by positive spikes again at P. These are indicated by small directional arrows.<sup>6</sup>



**Figure 3.** Potential sides for middle compartment defects: 1. Midline defect (central part of pubocervical fascia); 2. Paravaginal defect (collagenous ‘glue’ and ATFP: Arcus tendineus fascia pelvis); 3. High cystocele (attachment of pubocervical fascia to cervical ring, ‘transverse defect’. Schematic 2D view from below. Perspective: looking into the anterior wall of the vagina<sup>3</sup>



**Figure 4.** **Left:** Diagnosing a cardinal ligament/cervical ring defect. The vaginal tissue is grasped in the position of the cardinal ligaments, and approximated medially.<sup>3</sup> **Right:** Disappearance of the cystocele confirms cardinal ligament/cervical ring defect as the cause of the cystocele. Persistence of a bulge indicates the cystocele is central/paravaginal<sup>3</sup>

expression with the anterior zone structures that the Integral Theory identifies as central to continence control, particularly the pubourethral ligament, the suburethral hammock, and, in selected cases, the external urethral ligament.<sup>8</sup>

## SIMULATED OPERATIONS IN THE MIDDLE COMPARTMENT

Within the Integral Theory framework, the middle compartment extends from the bladder neck to the anterior cervical ring and includes the arcus tendineus fascia pelvis (ATFP), pubocervical fascia (PCF), and the cardinal ligament/cervical ring complex (**Figure 3, 4**). As there are no transverse ligaments in this zone, the PCF is regarded as the principal supporting structure. Defects in this compartment may occur in the midline, laterally, or at the cervical ring attachment, and correct identification of the damaged structure is considered essential before planning repair.<sup>3</sup>

From a functional perspective, middle zone defects may contribute to cystocele-related dysfunction and may also be associated with storage and emptying symptoms. Petros<sup>3</sup> notes that urgency and frequency may occur with damage in any zone, although they are more commonly linked to posterior zone defects, especially in older women. At the same time, connective tissue laxity in the middle or posterior zones may contribute to detrusor underactivity, overflow symptoms, post-micturition dribble, or even urinary retention. These observations highlight the importance of evaluating the middle compartment not only for prolapse, but also for functional bladder complaints.

In clinical practice, simulated operations in the middle compartment aim to determine whether temporary restoration of support to the PCF or its attachments modifies the patient’s symptoms or the visible prolapse pattern. This is particularly relevant in women with cystocele, abnormal emptying, or mixed symptom complexes, where the anatomical contribution of the middle zone may not be obvious from static examination alone. Within the Integral Theory diagnostic system, the pictorial algorithm is used together with examination and simulated operations to localize the likely origin of symptoms more precisely.

A further practical point is that the middle zone is considered one of the most difficult compartments to repair because it is exposed to intra-abdominal pressure from above and gravity from below. For this reason, preoperative localization of whether the defect lies in the central membrane, lateral attachments, or cervical ring attachment is emphasized. In this context, simulated operations may be useful as dynamic bedside tests that strengthen the link between middle compartment anatomy, prolapse configuration, and urinary dysfunction.

## SIMULATED OPERATIONS IN THE POSTERIOR COMPARTMENT

Within the Integral Theory framework, the posterior compartment extends from the posterior cervical ring to the perineal body and is closely related to the uterosacral ligaments (USLs), rectovaginal fascia (RVF), and posterior vaginal support structures. This zone is of particular clinical importance, as posterior compartment laxity has been associated with an increased likelihood of a characteristic symptom complex, including chronic pelvic pain, urgency, frequency, nocturia, abnormal bladder emptying, and obstructive defecation. In the pictorial diagnostic algorithm, chronic pelvic pain and nocturia are considered especially suggestive of uterosacral ligament laxity.<sup>3</sup>

Simulated operations in the posterior compartment are designed to determine whether temporary restoration of support to the posterior fornix or vaginal apex leads to symptom relief. In practice, this is most commonly achieved by mechanical support of the posterior fornix with a speculum, tampon, pessary, or similar maneuver.

Among posterior compartment tests, the speculum test is the best known. A gently inserted speculum placed into the posterior fornix may temporarily support lax USLs and the associated visceral nerve plexuses. In selected patients, this maneuver may reduce urgency, pelvic pain, or both.<sup>9,10</sup> The same principle has also been described using other temporary support methods, including a tampon or pessary placed to support the vaginal apex. These maneuvers attempt to reproduce, in a reversible and noninvasive way, the functional effect of posterior ligament repair.

The clinical relevance of this approach has been highlighted in recent literature on posterior fornix syndrome and IC/BPS-like symptoms.

In the Scheffler report, preoperative support of the vaginal apex with a speculum and later with a tampon considerably improved urge and pain before definitive repair. Similarly, the later review by Petros et al.<sup>10</sup> emphasized that posterior fornix syndrome (PFS) should be considered in women with bladder pain, urgency, frequency, nocturia, and abnormal emptying, especially when symptoms improve during temporary support of the posterior fornix. These observations suggest that posterior compartment simulated operations may be particularly informative in women with complex bladder and pelvic pain symptoms that are otherwise difficult to localize anatomically.

From a practical standpoint, posterior compartment testing is valuable because static examination alone may underestimate the functional importance of uterosacral ligament laxity. Some patients may have little or no obvious prolapse, yet still report prominent urgency, nocturia, pelvic pain, or voiding dysfunction. In such cases, symptom improvement during a simulated operation may provide useful clinical evidence that posterior support failure is relevant. This is especially important when evaluating patients with overlapping symptoms, in whom the relationship between anatomy and function is not immediately evident.

## CLINICAL INTERPRETATION AND LIMITATIONS OF SIMULATED OPERATIONS

Although simulated operations are a valuable component of the Integral Theory<sup>2</sup> diagnostic system, their findings must be interpreted in the broader clinical context. Symptom improvement during temporary support does not by itself establish a definitive diagnosis, but rather suggests that the tested compartment may be functionally relevant to symptom generation. In this sense, simulated operations should be understood as dynamic clinical tests that complement, rather than replace, history taking, examination, imaging, and other diagnostic investigations.

One of the main strengths of simulated operations is their ability to link symptoms with anatomy in real time. This may be particularly useful in women with overlapping complaints, such as mixed urinary symptoms, chronic pelvic pain, nocturia, or abnormal emptying, where static prolapse grading alone may not explain the clinical picture. By temporarily restoring support and observing whether symptoms improve, the examiner may gain practical insight into which vaginal zone is most likely contributing to the patient's dysfunction.

However, these maneuvers also have important limitations. First, they are inherently examiner-dependent and require familiarity with the anatomical principles of the Integral Theory. Second, patient responses may be subjective, especially when the outcome being assessed is pain, urgency, or sensory relief rather than visible stress leakage. Third, symptom improvement during a simulated operation may reflect partial rather than exclusive involvement of the tested compartment, since many pelvic floor symptoms arise from interacting defects across more than one zone.

Another limitation is that the absence of symptom relief does not necessarily exclude compartmental dysfunction. Some women may have advanced connective tissue damage, coexisting neurological or inflammatory conditions, or central sensitization phenomena that reduce the predictive value of temporary support maneuvers. In addition, the response may vary depending on the technique used, the degree of support achieved, bladder volume, and the symptom being tested. For these reasons, simulated operations should be interpreted as part of a structured diagnostic pathway rather than as isolated stand-alone tests.

Despite these limitations, simulated operations remain clinically attractive because they offer a simple, low-cost, bedside method for functional testing of suspected anatomical defects. In selected patients, especially those with posterior compartment symptoms or mixed pelvic floor complaints, they may provide useful support for diagnostic reasoning and help guide compartment-specific reconstructive planning. Their greatest value may lie not in absolute diagnostic certainty, but in narrowing the anatomical focus of evaluation and making the relationship between support failure and symptom expression more clinically visible.

## RELEVANCE OF SIMULATED OPERATIONS IN CONTEMPORARY UROGYNECOLOGICAL PRACTICE

In contemporary urogynecological practice, simulated operations retain particular relevance because they offer a functional approach to symptom assessment at the bedside. While modern evaluation increasingly incorporates imaging, urodynamics, and symptom questionnaires, these tools do not always clarify the relationship between anatomical findings and symptom generation. Simulated operations address this gap by allowing the examiner to test, in real time, whether temporary restoration of support modifies the patient's symptoms. In this respect, they remain consistent with the original aim of the Integral Theory diagnostic system: to connect symptoms, anatomical defects, and treatment strategy within a single clinical framework.

Another advantage of simulated operations is their accessibility. They are low-cost, rapid, and do not require sophisticated equipment, making them especially valuable in settings where advanced diagnostic resources may be limited. As emphasized in the Integral Theory text, the diagnostic algorithm and simulated operations were designed so that a high degree of diagnostic accuracy could be achieved at the clinical level without reliance on expensive technology. This gives the method continued practical value, particularly in resource-limited settings or in the initial evaluation of women with pelvic floor complaints.

At the same time, their place in modern practice should be viewed as complementary rather than competitive. Simulated operations are unlikely to replace imaging, cystoscopy, or urodynamics where these are indicated, but they may enrich interpretation by adding a dynamic and symptom-oriented dimension to clinical examination. Their contemporary value lies in helping the clinician move beyond static compartment description toward a more functional understanding of pelvic floor disorders. In this way, simulated operations continue to offer a clinically useful bridge between anatomical theory and individualized patient assessment.

## CONCLUSION

Urogynecological examination within the Integral Theory framework offers a structured and functional method and emphasizes the dynamic relationship between connective tissue support and symptom generation. In particular, simulated operations provide a practical bedside means of testing whether temporary restoration of support modifies clinical symptoms.

### Alev Esercan

I was born in Trabzon, in 1985. After completing my primary and secondary education in my hometown, I graduated from medical school with a fourth degree from Marmara University School of Medicine in English with a 2010. I then completed my residency training in Obstetrics and Gynecology between 2011 and 2015 at Zekai Tahir Burak Women's Health Education and Research Hospital. For my compulsory medical duty; I had worked at Şanlıurfa Training and Research Hospital for ten years. During this period I had worked as a chief physician of the hospital for two years and chief of the clinics for four years. At 2023, I achieved the degree of Associate Professor. I moved my hometown, Trabzon, in 2025 March. I have been working at Trabzon University Kanuni Training and Research Hospital since March 2025. During my career especially in Şanlıurfa, I was interested in maternal mortality, neonatal mortality improvement studies of Ministry of Health. I am also an inspector in clinical audit of mother-friendly hospitals in Turkey working with the Ministry of Health. I am interested in high-risk pregnancies especially diagnosing and the treatment of placenta adhesion spectrum disorders and urogynecology. Throughout my career, I have authored approximately 50 national and international scientific publications. Additionally, I have delivered numerous oral and poster presentations at various national and international scientific meetings. I am working as section editor and reviewer positions in both national and international journals. I am also a member of Royal College of Obstetrics and Gynecology (RCOG).



In contemporary practice, simulated operations remain relevant not as replacements for modern diagnostic tools, but as complementary functional tests that can refine clinical reasoning and support compartment-specific management. Their continuing value lies in helping clinicians connect anatomy, symptoms, and treatment planning in a more integrated and individualized way.

## ETHICAL DECLARATIONS

### Peer Review Process

This review was externally peer-reviewed.

### Conflict of Interest

The author declare no conflicts of interest.

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### Author Contributions

The author is solely responsible for the entirety of conception, execution, analysis, and writing of the manuscript.

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