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DIAGNOSTIC VALUE OF PELVIC FLOOR ULTRASONOGRAPHY FOR DIAGNOSIS OF PELVIC ORGAN PROLAPSE

Abstract. Female pelvic floor dysfunction encompasses a number of prevalent clinical conditions, including female pelvic organ prolapse, urinary and fecal incontinence, obstructed defecation, and sexual dysfunction. Pelvic Organ Prolapse (POP) is the hidden epidemic. In the USA it has been conservatively estimated that the prevalence of symptomatic POP will increase by 46% to reach 4.9 million women by 2050. POP is a major public health issue that will continue to grow in developed countries due to the aging populations.

Prolapse development is multifactorial, with vaginal child birth, advancing age, and increasing body-mass index as the most consistent risk factors.

The integrated lifespan model presented by De Lancey describes predisposing and inciting causal factors for the development of POP where childbirth is considered an important inciting factor.

Patients generally present with several complaints, including bladder, bowel, and pelvic symptoms; however, with the exception of vaginal bulging, none is specific to prolapse.

Women with symptoms suggestive of prolapse should undergo a pelvic examination. Physical exam (PE) remains the primary modality to evaluate POP, but clinical examination alone is not enough diagnosing pelvic floor dysfunction. The International Continence Society Pelvic Organ Prolapse Quantification (ICS POP-Q) system provides information on surface anatomy only and gives no information on underlying organs or functional anatomy. It can lead to underestimate or misdiagnose the site, degree, and nature of visceral prolapse of pelvic organ prolapse in 45–90% of patients and caused result in incorrect treatment and recurrence of symptoms in 10–30% of patients after surgery.

The diagnosis of prolapse of the posterior vaginal compartment, which gynecologists call posterior vaginal wall descent a ‘rectocele’, this appearance may be caused by at least five distinct anatomical conditions which are difficult to distinguish without imaging. These include true radiological rectocele, perineal hypermobility, enterocele, rectoenterocele, and rectal intussusception. Imaging can identify conditions that mimic cystocele, such as urethral diverticula or Gartner cysts, and also can show two types of cystoceles with different functional implications.

Therefore, we are needed additional diagnostic tools to make qualified decisions on conservative or surgical treatment. Transperineal sonography is the least invasive, cheapest, simplest, and most commonly available method for pelvic floor imaging. In addition, it has tremendous potential to be used as a research tool in trying to understand the pathophysiology of POP.

Childbirth is significantly associated with develop by urinary incontinence(UI) and POP. Levator avulsion is the traumatic disconnection of the puborectalis component of the levator ani from the os pubis. Levator avulsion injury may occur during vaginal delivery, and forceps delivery carries a higher risk of trauma to the pelvic floor muscles than vacuum and normal vaginal delivery. Childbirth-related morphological abnormalities or defects of the puborectalis muscle (“avulsion”) can be diagnosed not only by three-dimensional (3D) ultrasound but by 2D translabial ultrasound too. Enlarges the levator hiatus (LH), levator-urethra gap (LUG) as measured by 3-dimensional transperineal tomographic ultrasound are also associated with development of POP.

Thus, transperineal ultrasound is one of the most reliable and effective methods for diagnosing pelvic floor injuries and dysfunction.

Key words: pelvic organ prolapse, transperineal ultrasound, levator ani.

Pelvic organ prolapse (POP) has a deleterious impact on the quality of life for a large proportion of women worldwide, with a reported prevalence ranging from 2.9 to 50%, depending on definitions and population groups [1].

Pelvic Organ Prolapse (POP) is the hidden epidemic. In the USA it has been conservatively estimated that the prevalence of symptomatic POP will increase by 46% to reach 4.9 million women by 2050. Hence, POP is a major public health issue that will continue to grow in developed countries due to the aging populations [2].

Each year, approximately 300,000 women require surgery for POP and stress urinary incontinence. The direct cost of prolapse surgery is greater than \$1 billion per year [3].

Pregnancy and delivery are considered major risk factors in the development of POP and stress urinary incontinence (SUI). To date, pelvic organ support is generally quantified by clinical examination using the International Continence Society Pelvic Organ Prolapse Quantification (ICS POP-Q) system [4].

The ICS POP-Q was introduced in 1996 with an aim of standardizing assessment. Although ICS POP-Q is widely used, the staging system derived from POP-Q is based on expert opinion rather than data.

The system provides information on surface anatomy only and gives no information on underlying organs or functional anatomy. Staging of bladder, uterine, small bowel and rectal descent are identical under the quantification system, i.e. a uterus that descends to within 1 cm of the hymen is deemed to be as abnormal as the descent of the anterior or posterior vaginal wall in the same level [5].

Furthermore, the ICS POP-Q system uses a moving structure, the hymen, as the reference point to quantify pelvic organ descent, which may not be optimal for this purpose. Most importantly, almost 20 years after the introduction of this assessment system, it still lacks a definition of ‘normal’.

Significant POP is generally defined as ICS POP-Q stage 2 or above [6], and it is only very recently that information on the limits of ‘normality’ have become available [5,7].

As anatomy does not always correlate with urinary and bowel symptoms, additional diagnostic tools are needed to make qualified decisions on conservative or surgical treatment. For example, the diagnosis of prolapse of the posterior vaginal compartment, which is common in women with symptoms of prolapse and obstructed defecation: gynecologists call posterior vaginal wall descent a ‘rectocele’, but this appearance may be caused by at least five distinct anatomical conditions which are difficult to distinguish without imaging. These include true radiological rectocele, perineal hypermobility, enterocele, rectoenterocele, and rectal intussusception [8,9].

Transperineal ultrasound is a new alternative for the investigation of the functional anatomy of the pelvic floor, and cut-offs have been suggested to define clinically relevant descent of the urinary bladder, cervix, and rectum in relation to the sensation of a vaginal bulge [10].

Ingrid Volloyhaug et al. studied correlation between pelvic organ prolapse quantification (POP-Q) and ultrasound measurement prolapse in women from a normal population and tried to identify the method with a stronger association with prolapse symptoms. 590 parous women were examined using POP-Q and transperineal ultrasound and correlation was tested using Spearman’s rank test. The scientists concluded that POP-Q and ultrasound measurement of prolapse had moderate to strong correlation in the anterior and middle compartments and weak correlation in the posterior compartment. POP-Q had a stronger association than ultrasound with the symptom “vaginal bulge” [11].

Dietz et al. compared the results of the clinical examination and imaging findings. They retrospectively examined 825 women. All women were carried out a local standardized interview with symptoms of prolapse, the clinical examination included ICS POP-Q assessment and 4D translabial ultrasound. The authors concluded that US and clinical measures of prolapse have a near-linear relationship and found weaker agreement for all compartments (anterior 75%), the middle 69%, and posterior 63%) than in the Ingrid Volloyhaug et al.’s study [12].

The levator hiatus is the space bounded by the puborectalis component of the levator ani muscle and the os pubis. It is the largest potential hernia portal of the human body, so its dimensions matter for pelvic organ support, as does the integrity of the muscle that defines the hiatus [13].

Levator hiatal area of > 25 cm² on Valsalva as measured by 3D translabial pelvic floor ultrasound examination suggest that can consider as abnormal distensibility or ‘ballooning’ of the levator hiatus [14].

Levator avulsion is the traumatic disconnection of the puborectalis component of the levator ani from the os pubis. Levator avulsion injury may occur during vaginal delivery, and forceps delivery carries a higher risk of trauma to the pelvic floor muscles than vacuum and normal vaginal delivery [15,16,17].

Childbirth-related morphological abnormalities or defects of the puborectalis muscle (“avulsion”) can be diagnosed not only by magnetic resonance imaging and three-dimensional (3D) ultrasound but by 2D translabial ultrasound too. H. P. Dietz and K. L. Shek examined seventy-five women for major morphological abnormalities of the puborectalis muscle by palpation, 2D and 3D ultrasound (US). They concluded that the finding of a discontinuity between the hyperechogenic muscle and the pelvic sidewall is moderately reproducible and agrees moderately well with palpation and 3D US [18].

Lieming Wen et al. used Z scores to quantify hiatal distensibility and tested the performance of Z scores for levator hiatal areas in predicting substantial pelvic organ prolapse. They undertook a retrospective study of the data from 145 nulliparous and 166 patients with POP who had a clinical POP examination with 3-dimensional translabial ultrasonography. The authors defined a Z-Av value of less than 1.0 as a “normal hiatal expansion,” 1 to 3 as “mild ballooning,” 3 to 5 as “moderate ballooning,” 5 to 7 as “marked ballooning,” and 7 or greater as “severe ballooning”. Their findings were based on a sample of patients that was limited to a population of Chinese women. The applicability of the Z score is possible in specific populations whose normality curves are known, so the need to create specific population curves for clinical applicability [19].

Bence Kozma et al. evaluated the association between pelvic organ prolapse (POP) types and levator-urethra gap (LUG) as measured by 3-dimensional transperineal tomographic ultrasound. A retrospective study was carried out on 98 women with symptomatic POP. Abnormal LUG of 25mm or greater indicated levator avulsion. The researchers concluded that bilateral levator ani avulsion as diagnosed by LUG measurements of 25mm or greater at rest is associated with multicompartiment, severe prolapse [20-21].

Avulsion in turn enlarges the hiatus [22], results in anterior and central compartment prolapse [23] and reduces pelvic floor muscle function by about one-third [24].

Imaging can identify conditions that mimic cystocele, such as urethral diverticula or Gartner cysts, and also can show two types of cystoceles with different functional implications. Eisenberg V. H. et al. determined the prevalence of levator ani injury in patients with different types of cystocele. They evaluated 222 women presenting with symptoms of lower urinary tract and pelvic floor dysfunction. All patients were conducted a physical examination, urodynamic testing and four-dimensional (4D) pelvic floor ultrasound. The authors concluded, that a cystourethrocele is associated with good urine flow rates and urodynamic stress incontinence, while a cystocele with intact retrovesical angle is associated with voiding dysfunction and a low likelihood of stress incontinence. All women with Green type III cystocele had a levator injury on the tomographic ultrasound imaging. The researchers suggested, that a cystocele with an intact retrovesical angle associated with avulsion injury of the levator ani muscle, caused by birth-related trauma. This data contradicts the commonly held belief that such cystoceles are caused by central rather than by lateral fascial defects [25].

A proper diagnosis is a precondition for appropriate management of any clinical condition. For this aim, transperineal ultrasound offers a unique opportunity for diagnosing reliably pelvic floor injuries and dysfunction with a huge potential for improving women’s health by detecting preventable risk factors for these lesions, by encouraging early pelvic floor rehabilitation for women with asymptomatic lesions.

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ЖАМБАС ОРГАНДАРЫНЫҢ ПРОЛАПС ДИАГНОСТИКАСЫНДАҒЫ ТРАНСПЕРИНЕАЛДЫҚ УЛЬТРАДЫБЫСТЫҚ ЗЕРТТЕУДІҢ ДИАГНОСТИКАЛЫҚ ҚҰНДЫЛЫҒЫ

Аннотация. Әйел жамбасының қуыс түбінің жеткіліксіздігі бірқатар жалпы клиникалық жағдайды, соның ішінде, әйелдің жамбас мүшелерінің пролапсы (ЖМП), зәр мен нәжіс ұстамау, дефекация қиындығы мен жыныстық дисфункцияны қамтиды. ЖМП – жасырын індет. Америка Құрама Штаттарында, қарапайым есеп бойынша, симптоматикалық ЖМП таралуы 2050 жылға қарай 46%-ға артып, 4,9 млн. әйелге жетеді.

ЖМП даму қаупінің негізгі себептері – қынаптық босану, егде жастағы адам және дене салмағының индексін арттыру. DeLancey et al ұсынылған ЖМП дамуының бейімді және бастамашы факторын сипаттайтын интеграцияланған өмір сүру ұзақтығы моделі бойынша босану маңызды, қоздырушы фактор саналады.

Физиологиялық тексеру ЖМП бағалаудың негізгі әдісі болғанымен, жамбастың қуыс түбінің дәрменсіздігін диагностикалау үшін бірреттік клиникалық тексеру жеткіліксіз. ICS POP-Q анатомиялық пролапсты сандық анықтау үшін қолданылады және емдеу мүшесінің функционалдық анатомиясы туралы ешқандай ақпарат бермейді. Мұндай тәсіл емделушілердің 45-90% жуығында дұрыс бағаланбауға немесе қате топикалық диагностикаға әкелуі мүмкін, сол себепті дұрыс емделмейді және операциядан кейінгі пациенттердің 10-30%-да симптом қайталанатын.

Қынаптың артқы қабырғасының түсу диагнозы пролапс симптомы және дефекация обструкциясы бар әйелде жиі кездеседі: гинекологтар қынаптың артқы қабырғасының төмен түсуін «ректоцеле» деп атайды, бірақ бұл анықтама визуалдау әдісінің ажырату қиын болатын, аз дегенде, бес түрлі анатомиялық жай-күйден тууы мүмкін.

Оларға рентгенологиялық ректоцеле, қасағаның гипермобильділігі, энтероцеле, сигмоидоцеле және тік ішектің инвагинациясы жатады. Визуалдау әдістері цистоцеле имитациялайтын жай-күйді уретра дивертикулы немесе Гартнер кистасы сияқты цистоцеле түрлерін түрлі функционалдық жай-күй негізінде саралауы мүмкін.

Жоғарыда айтылғандарды ескерсек, консервативті немесе хирургиялық емдеуге қатысты ұтымды шешім қабылдау үшін қосымша диагностикалық әдістерді қолдану қажеттілігі айқын.

Трансперинеалдық сонография – инвазивті емес, арзан, қарапайым және кең таралған жамбас түбін визуалдау әдісі. Сонымен қатар, ол ЖМП патофизиологиясын түсіну үшін зерттеу құралы ретінде пайдалану барысында зор әлеуетке ие.

Босану едәуір дәрежеде стрестік зәрдің тоқтамауы мен ЖМП дамуына себеп болады. Леваторлық авульсия (үзілу) дегеніміз – құлпынай сүйегінен LAM пуборекталды компонентін травматикалық ажырату. Акушерлік қысқышты салу арқылы босандыру ұрықтың вакуум-экстракциясына және қынап туытына қарағанда Lam жаракатының даму қаупін жоғарылатады. Пуборекталды бұлшықеттің морфологиялық ауытқу немесе кемшілігін тек үшөлшемді (3D) УДЗ көмегі арқылы ғана емес, 2D трансперинеальды ультрадыбысты қолдану негізінде де диагностикалауға болады. Үшөлшемді трансперинеалдық томографиялық УДЗ көмегі арқылы өлшенетін леватор тесігінің (LH) және леватор-уретральды кесіндісінің (LUG) ұлғаюына, ЖМП дамуына байланысты.

Осылайша, трансперинеалды УДЗ – жамбастың қуысы түбінің зақымдануын және дисфункциясын диагностикалаудың берік және тиімді әдісінің бірі.

Түйін сөздер: жамбас мүшелерінің пролапсы, трансперинеалды ультрадыбыстық зерттеу.

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ДИАГНОСТИЧЕСКАЯ ЦЕННОСТЬ ТРАНСПЕРИНЕАЛЬНОГО УЛЬТРАЗВУКОВОГО ИССЛЕДОВАНИЯ В ДИАГНОСТИКЕ ПРОЛАПСА ТАЗОВЫХ ОРГАНОВ

Аннотация. Недостаточность тазового дна у женщин охватывает ряд распространенных клинических состояний, включая пролапс тазовых органов (ПТО), недержание мочи и кала, затрудненную дефекацию и сексуальную дисфункцию. ПТО является скрытой эпидемией. В США, по самым скромным подсчетам, распространенность симптоматического ПТО увеличится на 46% и достигнет 4,9 миллиона женщин к 2050 году. ПТО является основной проблемой здравоохранения, которая может охватить и развитые страны, в которых идет процесс старения населения.

Основными факторами риска развитие ПТО являются влагиальные роды, пожилой возраст и увеличение индекса массы тела.

Интегрированная модель продолжительности жизни, представленная DeLancey et al., описывает предрасполагающие и инициирующие факторы развития ПТО, где роды считаются важным провоцирующим фактором.

Физикальное обследование остается основным методом оценки ПТО, но одного клинического обследования недостаточно для диагностики несостоятельности тазового дна. ICS POP-Q используется для

количественного определения анатомического пролапса и не дает никакой информации о функциональной анатомии пролабирующего органа. Такой подход приводит к недооценке тяжести заболевания или к неправильной топической диагностике у 45–90% пациентов, что, в свою очередь, становится результатом неправильного лечения и возникновения рецидиву симптомов у 10–30% пациентов после операции.

Диагноз выпадения задней стенки влагалища часто встречается у женщин с симптомами пролапса и обструкции дефекации: гинекологи называют опущение задней стенки влагалища «ректоцеле», но это определение может быть вызвано как минимум пятью различными анатомическими состояниями, которые трудно различить без методов визуализации. К ним относятся рентгенологический ректоцеле, гипермобильность промежности, энтероцеле, сигмоидоцеле и инвагинация прямой кишки. Методы визуализации могут идентифицировать состояния, которые имитируют цистоцеле – такие, как дивертикулы уретры или кисты Гартнера, а также могут дифференцировать типы цистоцеле с различными функциональными состояниями.

Исходя из вышеизложенного, становится очевидной необходимость применения дополнительных диагностических методов для принятия квалифицированных решений относительно консервативного или хирургического лечения.

Трансперинеальная сонография является неинвазивным, недорогим, простым и наиболее распространенным методом визуализации тазового дна. Кроме того, она обладает огромным потенциалом для использования в качестве инструмента исследования в попытке понять патофизиологию ПТО.

Роды в значительной степени связаны с развитием стрессового недержания мочи и ПТО. Леваторная авульсия (отрыв) – это травматическое отсоединение пубо-ректального компонента LAM от лонной кости. Родоразрешение с наложением акушерских щипцов имеет более высокий риск развития травм LAM, чем вакуум-экстракция плода и влагалищные роды. Морфологические аномалии или дефекты пубо-ректальной мышцы можно диагностировать не только с помощью трехмерного (3D) УЗИ, но и с применением 2D трансперитонеального ультразвука. Увеличение леваторного отверстия (LH) и леваторно-уретрального отрезка (LUG), которые измеряются с помощью трехмерного трансперинеального томографического УЗИ, также связаны с развитием ПТО.

Таким образом, трансперинеальное УЗИ является одним из надежных и эффективных методов диагностики повреждений и дисфункции тазового дна.

Ключевые слова: пролапс тазовых органов, трансперинеальное ультразвуковое исследование, леватор ани.

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