1. Endometriosis and Pelvic Pain Center. Montesur Clinic, Lima – Peru. ORCID ID: 0009-0003-7504-4163.

Endometriosis: clinical diagnosis
Endometriosis: diagnostico clínico

Dr. José Negrón Rodríguez[1]

ABSTRACT

Endometriosis is a inflammatory chronic systemic disease that can cause pain, infertility and reduced quality of life. Diagnosing endometriosis remains challenging, which yields diagnostic delays for patients. There are no characteristic or pathognomonic symptoms of endometriosis; however, the association of specific symptoms increases the likelihood of diagnosing the disease. Dysmenorrhea, dyspareunia, dyschezia, dysuria, chronic pelvic pain, and infertility are all associated with endometriosis. Physical examination allows us to detect endometriosis by visualization or palpation, assessing pain sites and pelvic organ mobility. Currently, there are no specific biomarkers for endometriosis. Ultrasound (TV) and magnetic resonance imaging (MRI) are important tools to aid in the diagnosis and spread of disease. Definitive diagnosis requires histological confirmation of the excised tissue, obtained through surgery, preferably minimally invasive surgery, either laparoscopic or robotic.

Keywords: Endometriosis; symptoms; physical exam; diagnosis; MRI; ultrasound (TV).

RESUMEN

Endometriosis es una enfermedad inflamatoria sistémica crónica que puede causar dolor, infertilidad y reducción de la calidad de vida. El diagnóstico de endometriosis sigue siendo un desafío lo que produce retrasos en el diagnóstico para las pacientes. No existen síntomas característicos o patognomónicos de endometriosis, sin embargo, la asociación de síntomas específicos nos conduce a tener mayores probabilidades de diagnosticar la enfermedad. Dismenorrea, dispareunia, disquecia, disuria, dolor pélvico crónico e infertilidad están asociados a endometriosis. El examen físico, nos permite detectar endometriosis por visualización o palpación, evaluar los sitios de dolor y la movilidad de los órganos de la pelvis. No existen en la actualidad biomarcadores específicos de endometriosis. Las imágenes por ecografía TV y por resonancia magnética son importantes herramientas de ayuda en el diagnóstico y extensión de la enfermedad. El diagnóstico definitivo requiere de la confirmación histológica del tejido escindido, obtenido a través de la cirugía, de preferencia cirugía de mínima invasión ya sea laparoscópica o robótica.

Palabras clave: Endometriosis, síntomas, examen físico, diagnóstico, resonancia magnética, ecografía TV.

INTRODUCTION

One of the fundamental axioms of medicine is that, in order to successfully diagnose and treat a disease, it is essential to understand its etiology, epidemiology, and demographic characteristics[1]. Endometriosis is a condition that, precisely, falls outside this theoretical framework[2]. Its origin remains unknown, and our current understanding has largely been shaped by the 'retrograde menstruation' hypothesis proposed by J.A. Sampson more than a century ago[3]. Although this hypothesis has yet to be conclusively demonstrated and does not account for the full spectrum of the disease, it did establish the term by which we know the condition today: endometriosis[2].

What is endometriosis? Answering this question is not straightforward, particularly when we are addressing a patient with limited medical knowledge. The classical definition of endometriosis as 'a disease characterized by the presence of glandular and stromal epithelium similar to the endometrium outside the uterine cavity'[4] is fundamentally a histological description. Clinically, endometriosis should be understood as a chronic inflammatory disorder secondary to the presence of ectopic endometrial tissue, dependent on estrogen, with autonomous production of pro-inflammatory, angiogenic, and neurogenic factors that ultimately lead to adhesions and fibrosis, pelvic pain, and

potential impairment of reproductive function. However, endometriosis is a systemic disease that extends beyond the organs of the reproductive system and affects mood, metabolism, autoimmune processes, increases cancer risk, and impacts the cardiovascular system[5,6]. Because it lacks a clearly established etiology, it does not have a definitive treatment. The therapies currently available aim to alleviate symptoms and provide temporary solutions to specific issues, such as quality of life and fertility.

The 1990s marked a significant shift in the study, diagnosis, and management of endometriosis with the publication of an article introducing the concept of lesion depth[7], followed by another proposing that endometriosis of the ovary, peritoneum, and rectovaginal septum should be regarded as three distinct diseases[8]. Since then, increasing attention has been directed toward the diagnosis and treatment of the condition and its manifestations across various organs both within and beyond the pelvis.

Endometriosis affects around 10% of women of reproductive age with a uterus, 60% with chronic pelvic pain, 80% with dysmenorrhea, and 30%–50% with infertility[9,10]. The disease has a negative impact on the personal, family, and professional quality of life of women who suffer from it[11,12].

One of the major challenges in addressing endometriosis, despite its high prevalence, is the persistence of myths and taboos surrounding 'menstrual pain' and the societal normalization of such pain. Even more concerning, however, is the limited understanding and insufficient knowledge of the disease among healthcare professionals.

Epidemiology

In Peru, the prevalence and incidence of endometriosis remain unknown; the data currently used are derived from published literature on the condition. Estimating the prevalence of the disease in the general population is challenging, as some women are asymptomatic while others present with a range of nonspecific symptoms. Moreover, endometriosis is diagnosed surgically, with confirmation through histopathological examination, an essential factor that underscores the inequities in access to healthcare in our country.

One in ten women of reproductive age with a uterus suffers from endometriosis[9]. An Israeli study of 2 million women who use a health service, unselected, low-risk, shows that the prevalence of the disease in the general population increases from a nadir of 1 per thousand among 15- to 19-year-olds; to about 2 per thousand among 20- to 24-year-olds; 6 per thousand at 25–29 years of age; increases to 16 per thousand at 35–39 years of age; and peaks at 18 per thousand at 40–44 years of age and then declines[13].

Background

The average age of onset of endometriosis is 33.2 years, and its prevalence increases from adolescence and peaks in the fourth decade of life[13]. It is more common in women with early menarche (≤ 11 years) and short menstrual cycles (< 27 days), heavy menstrual bleeding, menstrual flow obstruction, intrauterine exposure to diethylstilbestrol, or adult exposure to endocrine-disrupting chemicals (dioxins, polychlorinated biphenyls, organochlorine pesticides, phthalate esters such as DEHP, used in the manufacture of plastics, medical products, cosmetics, food packaging, etc.)[14], tall stature and low body mass index, and they also have fewer pregnancies or find it more difficult to become pregnant and therefore seek medical help. The risk is lower in women with high parity, prolonged breastfeeding, and late menarche (> 14 years).[15,16].

Family history is very relevant, as there is a genetic susceptibility to endometriosis, with the risk of developing the disease being 2-15 times higher in first-degree relatives[10]. An Australian study with a large cohort of monozygotic twins shows a hereditary component in more than 50% of cases and a common genetic variant in around 26%[17].

There are medical conditions associated with endometriosis that constitute an additional risk factor, such as the clear association of endometriosis with gastrointestinal and immunological diseases, thyroid diseases, including thyroid cancer, gynecological cancers, ovarian cancer, endometrial cancer, and also autoimmune diseases and allergies (gluten, lactose, etc.)[18,19].

Diagnosis of endometriosis

One of the biggest problems with endometriosis is late diagnosis. In the last decade of the last

century, articles appeared reporting a considerable delay in the diagnosis of the disease of up to 12 years[20]. Important factors that delay diagnosis include myths and taboos surrounding "menstrual pain" and the "normalization of menstrual pain" in adolescents, both in the community and among health professionals[21]. The delay in diagnosis in young women is also attributed to the fact that doctors do not consider the diagnosis of endometriosis in adolescents, assuming that the disease develops over many years and that not enough time has passed since menarche[22]. In the region, a Brazilian cohort study shows that the median time from symptom onset to diagnosis of endometriosis was 7 years (range 3.5–12.1 years) and in the adolescent group the median time was greater than 12.1 years (range 8.0–17.2 years), recommending that more information should be provided to general practitioners and gynecologists to reduce the time it takes to diagnose this condition[23]. Endometriosis in adolescence is not a rare condition, and the concept that adolescents only have early and mild stages of the disease is completely wrong; more than 40% have severe forms of the disease (ovarian endometrioma and deep infiltrating endometriosis)[24].

It is deeply concerning that the vast majority of women with endometriosis—who already endure the burden of the disease—experience additional suffering due to the number of physicians they must consult before receiving a diagnosis, which constitutes yet another factor contributing to diagnostic delay. Studies indicate that 76.5% of patients consulted an average of five physicians, resulting in a delay of 7.3 ± 0.3 years, with the longest delays associated with higher numbers of consultations. In this cohort, the diagnosis of endometriosis was established by gynecologists in 69% of cases, by general practitioners in 3.9% of cases, and by other specialists in 4.5% of cases[25].

This should raise awareness among the members of our profession so that the delay in diagnosing endometriosis becomes shorter and shorter.

Symptoms

There are no characteristic or pathognomonic symptoms of endometriosis. It may present with few symptoms or manifest with florid symptoms, evolve over time, or overlap with pre-existing conditions. However, the association of specific symptoms leads us to have a higher probability of diagnosing the disease.

Endometriosis can be clinically oriented under two symptoms: pelvic pain and infertility.

Pain

What is pain? It is a term that is difficult to define. An old popular saying goes, "Pain is like love, you feel it, but you can't define it." However, in order to understand each other and speak the same language, the International Association for the Study of Pain defines 'pain' in its initial version as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage"[26]. The revised version from 2020 states, "Pain is an unpleasant sensory and emotional experience associated with, or similar to, that associated with actual or potential tissue damage"[27].

Pain is the cardinal symptom of the disease. Endometriosis causes profound inflammation in the pelvis and systemically. Peritoneal fluid and lesions contain a variety of cell types that produce a complex environment dominated by inflammatory, angiogenic, and endocrine mediators, which stimulate nociceptors, producing fibrosis and scarring and, consequently, pain[28]. There are also alterations in pain processing at both the peripheral and central nervous system levels, including visceral and central sensitization[29,30].

What does pain in endometriosis mean?

Pain in endometriosis can mean: Dysmenorrhea, Dyspareunia, Dyschezia, Dysuria, Chronic pelvic pain.

Dysmenorrhea

It is characterized by visceral pain in the lower abdomen, with cramps and colic, which can radiate to the back and upper thighs. It occurs during menstruation and is one of the most prominent symptoms of endometriosis. The pain usually begins several days before the onset of menstrual flow and may be present for much of the menstrual period[31].

Women who experience dysmenorrhea have an almost 20 times higher risk of having endometriosis than those who do not[32].

Dysmenorrhea is the most common gynecological symptom among adolescents, with a prevalence of 50% to 90%. It seriously affects the physical and mental health of adolescents, causing school absenteeism, sleep disturbances, anxiety, and depression, making it a significant public health problem[33,34].

Dysmenorrhea is the most common symptom of pain and the greatest perception of pain in women with endometriosis. However, although dysmenorrhea is a key symptom in endometriosis, on its own it has limited diagnostic value, with a sensitivity of 59.9%, but relatively better specificity, 74.3%, in the diagnosis of mild to moderate endometriosis[35]. A recent study comparing the "classic" pain parameters in patients with and without endometriosis shows that both groups experience dysmenorrhea, but the frequency and severity are significantly different, with a cutoff value ≤ 3 NRS (Numerical Rating Scale), 97.2% of women with endometriosis have dysmenorrhea vs. 73.9% of women without the disease. In addition, pain intensity was significantly higher in women with endometriosis (7.8 ± 2.2) compared to women without endometriosis (5.1 ± 3.8), (p=0.0001). Furthermore, women with endometriosis experience longer duration of pain during menstruation than women without the disease[36].

At the primary health care level, dysmenorrhea should be used as the main screening indicator to identify adolescents at risk of developing endometriosis[32].

DISPAREUNIA

This is another manifestation of pain in endometriosis that is underestimated or overlooked because there is reluctance or taboo in our society regarding female sexuality.

Endometriosis is associated with deep dyspareunia, which is defined as pain or discomfort during deep penetration and is felt in the vaginal canal or pelvis[37]. Dyspareunia affects a woman's sex life by reducing the number and quality of sexual encounters, compromising sexual activity, fertility, self-esteem, and sexual satisfaction, thereby altering quality of life[38]. A recent observational study found deep dyspareunia in 85.2% of women with deep endometriosis[38], especially those with involvement of the retrocervix and uterosacral ligaments, who have greater impairment of sexual function, particularly those with nodules, who have a higher pain index, fewer sexual relations, and fewer orgasms[39]. These data suggest that deep endometriosis is the phenotype of endometriosis most associated with dyspareunia and sexual dysfunction.

DYSCHEZIA

Dyschezia, or painful defecation, is a predominant symptom in endometriosis, particularly in the deep endometriosis phenotype. Around 68% of patients with colorectal endometriosis present this symptom[40].

Regardless of endometriosis phenotypes, a large proportion of women complain of pain associated with defecation when compared to women without the disease (46.9% vs. 15.2%), as well as functional alterations of the digestive tract, constipation (40.1%), and diarrhea (35.6%)[36].

Dyschezia can be considered a useful predictor of deep endometriosis of the posterior compartment, the severity of which is related to the involvement of the posterior vaginal wall, rectovaginal septum, and anterior rectal wall. Similarly, the extent of the lesion in these areas is directly related to the severity of dyschezia, acting as a possible indicator of pain in deep endometriosis[41].

DYSURIA

Dysuria has traditionally been considered one of the "classic" organ-related symptoms associated with endometriosis. However, the frequency of urinary tract endometriosis is not high, ranging from 0.3% to 12% of all women with endometriosis[42], but in women with deep endometriosis, the frequency can reach more than 52%[43]. Other associated symptoms may include increased urinary frequency, urgency, burning sensation in the urethra, and discomfort in the retropubic area. These symptoms usually begin in the premenstrual period and are often confused with urinary tract infection, and urine culture tests are usually negative. Hematuria is also not a predominant symptom, as it occurs in less than 20%

of women with bladder endometriosis[44].

These associated symptoms were explained in terms of the involvement of the related organ (bladder, ureter, or urethra), but only a few of them could be explained by direct injury. We now know, although masked by pelvic pain, that the majority of bladder and sphincter disorders observed in endometriosis, such as daytime and nighttime pollakiuria or urge incontinence, spontaneous and stress incontinence, urinary urgency, bladder pain, dysuria, urinary retention, colic or pain during or at the end of urination, decreased bladder sensitivity, gross hematuria, and lower back pain, are the result of damage to the pelvic autonomic nervous system due to direct infiltration of the hypogastric plexus by endometriotic lesions in combination with the inflammation caused by the disease[45,46].

In conclusion, it is important to explore the clinical semiology of these manifestations associated with endometriosis due to the potential functional damage they can cause.

Chronic pelvic pain

Chronic pelvic pain is pain located in the lower abdomen, pelvis, or intra-pelvic structures that lasts for at least six months. It can be continuous or intermittent and is not associated with menstruation[47]. It is a debilitating, complex condition of a multifactorial nature.

How common is the association between endometriosis and chronic pelvic pain? The frequency found in the literature varies, with around 80% (71%–87%) of women with chronic pelvic pain having endometriotic lesions confirmed by laparoscopy[48]. However, the location of the lesions correlates poorly with the locations that patients identify as their areas of most intense pain[49].

Chronic pain per se is pathological and often persists long after the stimulus or injury that caused it has resolved. It is not the purpose of this article to discuss the complexity of the pathophysiology of this condition, but it is necessary to mention that the chronicity of pain is the result of functional and structural reorganizations of the central nervous system that sustain the perception of pain and facilitate its spread to distant regions[50].

Pain in endometriosis may also mean:

Abdominal bloating

Intestinal discomfort in endometriosis is complex to interpret. Gynecologists often focus on symptoms related to intestinal endometriosis that may produce mechanical disturbances, explaining patients' complaints on that basis. However, a range of functional gastrointestinal disorders associated with the disease presents specific symptoms that have not always been adequately recognized or linked to endometriosis.

A cohort study shows that women with endometriosis experience more abdominal discomfort and pain, constipation, bloating, flatulence, and increased bowel movements, which are cyclical in some and acyclical in others, compared to normal women[51].

Cyclical abdominal bloating is a common occurrence in endometriosis, referred to in the English-language literature as "Endo Belly." Although abdominal bloating can be a normal part of the menstrual cycle in most women, in women with endometriosis the bloating is much more intense, occurring during the second half of the menstrual cycle and before menstruation, with the abdomen becoming increasingly swollen, increasing discomfort and pain due to the increased sensitivity of the intestinal wall[52].

Lower back pain and cyclical sciatica

Another manifestation of pain in endometriosis is neuropathic pain, a typical example of which is sciatica, referring to pain caused by irritation or compression of the sciatic nerve, which extends from the lower back through the buttocks and down the leg to the foot.

In 1946, Dr. Schlicke reported the first case of sciatica associated with endometriosis[53]. The main characteristic is the cyclical nature of sciatica, and women with endometriosis usually prioritize the other symptoms of the disease, so sciatic pain takes a back seat and is not usually considered by the gynecologist. These patients seek help from other specialists, usually the orthopedist or neurologist.

The emergence of neuropelviology as a distinct discipline dedicated to pelvic nervous system pathologies and neurological diagnoses has improved the understanding of chronic pelvic pain, opening up a promising avenue for treatment[54].

INFERTILITY

A possible link between endometriosis and infertility is outlined in the Corpus Hippocraticum, which urged young women who had painful periods to conceive as soon as possible in order to increase their chances of becoming pregnant[55].

The association between endometriosis and infertility is still far from being clearly elucidated. Nevertheless, clinical and epidemiological evidence shows a consistent relationship: about 30% of women with endometriosis are infertile, and more than 50% of infertile women have endometriosis, with the risk of infertility being four times higher[56].

The mechanisms of this association have not been fully explained, but the most frequently mentioned are pelvic anatomical changes caused by adhesions and fibrosis, and immunological and endocrine abnormalities. However, it is actually multifactorial and increasingly complex.

QUANTIFYING SYMPTOMS

Several scales are available to assess pain symptoms in endometriosis. One of the main tools and one of the most widely used for interviewing patients about their pain level is the Visual Analogue Scale (VAS). The VAS is considered the gold standard and consists of a 10 cm horizontal line with the ends marked "No Pain" and "Worst Pain Imaginable." The Numerical Rating Scale (NRS) is a segmented numerical version of the VAS in which patients select an integer from 0 to 10 on a horizontal line or bar. The NRS better reflects or assesses pain intensity. Another scale used to assess different types of pain is the Verbal Rating Scale (VRS). With this type of scale, patients assess the intensity of their pain from "absent" (0) to "severe" (3) or from 'none' (0) to "very severe" (5).[57,58].

These tools allow us to evaluate: Dysmenorrhea, Dyspareunia, Dyschezia, Chronic Pelvic Pain, and Dysuria.

MEDICAL HISTORY

The diagnosis of endometriosis is based on symptoms, clinical signs, and physical examination. A detailed medical history should be taken, with particular emphasis on gynecological symptoms and signs, as well as other areas, most common to the disease and its severity. The visual analog scale is a useful clinical assessment tool.

The evaluation of the "classic" symptoms of endometriosis: dysmenorrhea, dyspareunia, dyschezia, dysuria, chronic pelvic pain, and infertility, viewed as a clinical unit, increases the likelihood of a diagnosis of the disease.

A recent study evaluating a predictive model for the non-invasive diagnosis of endometriosis based on multiple clinical parameters shows that the diagnosis of endometriosis based on its decision tree has a sensitivity of 0.904, a specificity of 0.750, a positive predictive value of 0.874, and a negative predictive value of 0.802[36]. These results are promising for accurate clinical diagnosis and patient follow-up before and after surgical treatment.

PHYSICAL EXAMINATION

The physical examination consists of a general somatic evaluation, inspection, and palpation of the abdomen. The pelvic evaluation in particular is based on inspection of the external genitalia. The speculum examination is very important for determining the presence or absence of endometriosis of the posterior vaginal fornix. The bimanual examination allows us to evaluate the size and characteristics of the uterus, as well as its orientation, mobility/fixation, presence of adnexal masses, and site-specific tenderness in the pelvis, including the

FIGURE TAKEN FROM REF. (59)
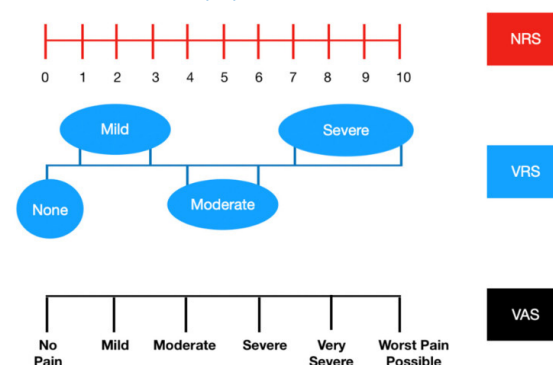
pelvic floor muscles. The digital vaginal examination also allows us to determine the presence or absence of thickening, stiffness, or nodules in the uterosacral ligaments, torus uterinus (retro-cervix), posterior vaginal fornix, rectovaginal septum, lower rectum, and parametrium.

What is the strength of the physical examination? The physical examination gives us the opportunity to detect endometriosis by visualization or palpation, evaluate the sites of pain and the mobility of the pelvic organs. For example, if I visualize and palpate endometriotic lesions in the vagina, I am faced with an extensive and more severe disease. (Photo 1, Photo 2)

Physical examination has been shown to be highly effective in diagnosing posterior compartment endometriosis, depending on the anatomical location, with high sensitivity (89%–100%) and specificity (72%–96%)[60,61].

In summary, physical examination has the strengths of being accessible, highly specific, and offering the opportunity to diagnose deep endometriosis by visualization or palpation. However, it has limitations, including low sensitivity, diagnostic efficacy that varies with location, and the fact that the examination can be considered invasive and painful. Most significantly, the results are operator-dependent and depend on the examiner's experience[62].

EFFECTIVENESS OF DIAGNOSTIC TESTS

The usefulness and validity of a diagnostic test are mainly defined by its sensitivity and specificity for a particular disease. However, these values are sometimes difficult to interpret in decision-making. Clinicians need to know the probability that a positive or negative test will correctly predict that a person has the disease (positive predictive value, PPV) or does not have it (negative predictive value, NPV)[63].

However, the PPV and NPV values of a particular diagnostic test may be biased if they are not adjusted for the prevalence of the disease. In such circumstances, the results should be assessed using the likelihood ratio (LR), which is the probability that a given test result would be expected in a patient with the disease compared to the probability of the same result being expected in a patient without the disease. The LR is used to evaluate the usefulness of a diagnostic test and select the appropriate test modalities for a specific disease, especially because it is less likely to change with the prevalence of the disease[62,64].

PHOTO 1 (COURTESY OF DR. J. NEGRÓN)

PHOTO 2 (COURTESY OF DR. J. NEGRÓN)
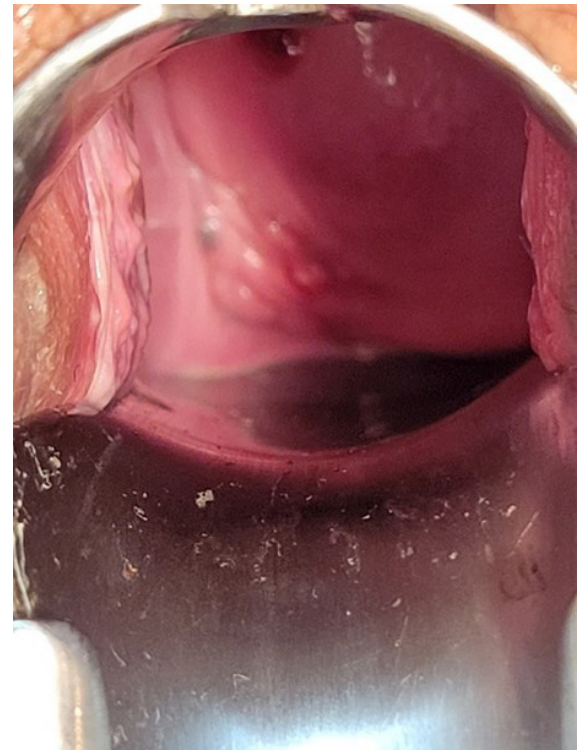
BIOMARKERS

Despite extensive research over the past two decades, specific biomarkers for endometriosis have not yet been identified or validated in multicenter clinical trials to diagnose and/or stage the disease and match or exceed the 94% sensitivity and 79% specificity cutoff values provided by laparoscopy (65).

Current research has focused on three lines of investigation of biological markers of endometriosis: eutopic endometrium, blood, and saliva (66).

- Endometrial markers:

  - Genomic expression and DNA methylation

  - Expression of B-cell lymphoma 6 (BCL6)

  - RNA and microRNA in menstrual endometrium

- Circulating biomarkers:

  - Cancer antigen 125 (CA 125)

  - MicroRNAs

  - Protein markers

  - Peripheral blood mononuclear cells (PBMCs)

  - Cell-free circulating DNA (cfc-DNA)

- Saliva biomarkers: MicroRNAs

Having one or more biological markers for endometriosis would enable early diagnosis in at-risk groups, evaluation of post-surgery results, and assessment of recurrence, which remains an unresolved issue.

DIAGNOSIS BY IMAGING

Imaging plays a key role in the diagnosis of endometriosis. The most commonly used tools are transvaginal ultrasound (TVU) and nuclear magnetic resonance imaging (MRI).

TRANS VAGINAL ULTRASOUND

Transvaginal ultrasound is the first-line tool for diagnosing endometriosis. In 2016, a consensus opinion was published for the first time on the evaluation of the pelvis in women with suspected endometriosis, including terms, definitions, and measurements (International Deep Endometriosis Analysis (IDEA) group), which has allowed for standardization in ultrasound evaluation[67].

The strengths of TV ultrasound are its high sensitivity and specificity in the diagnosis of ovarian endometriosis, high accuracy in the detection of deep endometriosis and obliteration of the Douglas pouch, the dynamic nature of the assessment of pelvic organ mobility, the ability to perform anatomical mapping, the provision of visual evidence to patients, and its high tolerability and low cost[62].

The limitations are the restricted ability to diagnose superficial endometriosis, the need for highly trained sonographers, the operator-dependent results, and the fact that the examination can be invasive and painful[62].

Considering the diagnostic efficacy of TV ultrasound for the different phenotypes of the disease, we have: Superficial endometriosis, sensitivity between 65% and 79%, specificity 91% to 95%; Ovarian endometriosis, sensitivity 93% and specificity 96%; for deep endometriosis, sensitivity 79% and specificity 94%[68].

MAGNETIC RESONANCE IMAGING

Magnetic resonance imaging is the second-line tool in the diagnosis of endometriosis, especially the deep phenotype. It has high sensitivity and specificity in all compartments of the pelvis (69). In a meta-analysis, the combined sensitivity and specificity for the diagnosis of deep endometriosis, regardless of location, is 94% and 77%, respectively[68].

The strengths of the method are: the images obtained are the same for all observers, high accuracy in the diagnosis of deep endometriosis and extrapelvic endometriosis, adequate anatomical mapping, and it provides visual evidence to patients[62].

The limitations are: it is a static evaluation, limited ability to diagnose superficial endometriosis, no standard evaluation protocol, low accuracy in defining intestinal infiltration, requires specific training for endometriosis, no consensus on how to describe findings, and it is expensive and less accessible compared to TV ultrasound[62].

The diagnostic accuracy for the different phenotypes of endometriosis is: Superficial Endometriosis, sensitivity 79% and specificity 72%; Ovarian Endometriosis, sensitivity 95% and specificity 91%; Deep Endometriosis, sensitivity 94% and specificity 77%[68].

USEFULNESS OF IMAGES

Images obtained by TV ultrasound or magnetic resonance imaging allow us not only to diagnose endometriosis, but more importantly, to diagnose the extent of the disease. Under this concept, both TV ultrasound and magnetic resonance imaging are compatible with the application of the #Enzian classification, which leads us to a systematic description and classification of the disease[70, 71].

The evaluation of imaging findings is of crucial importance, as it will enable us to make the most appropriate decisions regarding treatment, whether medical or surgical.

In the case of surgical treatment, preoperative images will facilitate adequate surgical planning. Considering the location and exact measurement of deep lesions, we can predict the duration, complexity, and risks of surgery. The objective is to avoid unnecessary surgeries and allow for a differentiated indication for each intervention[72].

DEFINITIVE DIAGNOSIS

The definitive diagnosis of endometriosis requires histological confirmation (endometrial glands, stroma, fibrosis), and this requires surgery to obtain the lesion tissue, i.e., endometriosis is recognized during surgery and defined by pathological anatomy. However, neither surgery nor pathological anatomy are the gold standard in the diagnosis of endometriosis. Both are operator-dependent, vary with the thoroughness of the pathological examination, and some lesions may not be recognized during surgery[2].

I consider minimally invasive surgery—whether laparoscopic or robotic—to be the modalities of choice for the optimal diagnosis and management of endometriosis. Given that the disease frequently involves multiple organs (disease dissemination), appropriate surgical planning and comprehensive informed consent are essential. Endometriosis surgery is complex and carries inherent risks; it requires profound knowledge of pelvic anatomy and must be performed by a gynecologist with expertise in the surgical management of the condition. In certain cases, a multidisciplinary team is warranted. The purpose of this chapter is not to examine the surgical approach in detail; this topic will be addressed in the corresponding chapter."

CONCLUSIONS

One of the biggest problems is the late diagnosis of endometriosis. Considering that our country has limited resources for public health, it is important for general gynecologists to take into account all aspects related to the clinical diagnosis of endometriosis, dispel myths and taboos regarding painful menstruation, consider the prevalence, symptoms, and signs associated with the disease, perform thorough physical examinations, and, in the absence of a specific biomarker, knowledge of the use of imaging as an aid in the diagnosis of endometriosis, whether TV ultrasound or magnetic resonance imaging, is essential. It is important to always remember that these tests are operator-dependent and must be performed and reported by experts. A definitive diagnosis requires histological confirmation of the excised tissue, obtained through surgery, preferably minimally invasive surgery, either laparoscopic or robotic.

REFERENCES

1. Wright J. The origins of Endometriosis. In: Nasar N. Amso, Saikat Banerjee, Editors. Endometriosis: Current Topics in Diagnosis and Management. CCR Press. 2022.

2. Negrón J. Recurrencia de la Endometriosis. En: Endometriosis: Prevención, Diagnóstico, Tratamiento. Colegio Médico del Perú. Fondo Editorial Comunicacional. 2023.

3. Sampson JA. Peritoneal Endometriosis due to the menstrual dissemination of endometrial tissue into the peritoneal cavity. Am Obstet Gynecol. 1927; 14(4): 422-469.

4. International Working Group of AAGL, ESGE, ESHRE and WES, Tomassetti C, Johnson NP, Petrozza J, Abrao MS, Einarsson JI, Horne AW, Lee TTM, Missmer S, Vermeulen N, Zondervan KT, Grimbizis G, De Wilde RL. An International Terminology for Endometriosis, 2021. Facts Views Vis Obgyn. 2021 Dec; 13(4): 295-304. doi: 10.52054/FVVO. 13.4.036. PMID: PMC9148705.

5. Alderman MH, Yoder N, Taylor HS. The systemic effects of endometriosis. Semin Reprod Med. 2017;35(3):263-270. doi: 10.1055/s-0037-1603582.

6. Taylor HS, Kotlyar AM, Flores VA. Endometriosis is a chronic systemic disease: clinical challenges and novel innovations. Lancet Lond Engl. 2021;397(10276):839-852. doi: 10.1016/S0140-6736(21)00389-5.

7. Cornillie FJ, Oosterlynk D, Lauweryns JM, Koninckx PR. Deeply infiltrating pelvic endometriosis: histology and clinical significance. Fertil Steril. 1990; 53: 978-983. doi: 10.1016/S0015-0282(16)53570-5.

8. Nisolle M, Donnez J. Peritoneal endometriosis, ovarian endometriosis and adenomyotic nodules of the rectovaginal septum are three different entities. Fertil Steril. 1997; 68: 585-596. doi: 10,1016/S0015-0282(07)00191-X.

9. Giudice LC. Clinical practice. Endometriosis. N Engl J Med. 2010;362(25):2389-2398. doi: 10.1056/NEJMcp1000274.

10. Zondervan KT, Becker CM, Koga K, Missmer SA, Taylor RN, Viganò P. Endometriosis. Nat Rev Dis Primer. 2018;4(1):1-25. doi: 10.1038/s41572-018-0008-5.

11. Culley L, Law C, Hudson N, et al. The social and psychological impact of endometriosis on women's lives: a critical narrative review. Hum Reprod Update. 2013;19(6):625-639. doi: 10.1093/humupd/dmt027.

12. La Rosa VL, De Franciscis P, Barra F, et al. Quality of life in women with endometriosis: a narrative overview. Minerva Med. 2020;111(1):68-78. doi: 10.23736/S0026-4806.19.06298-0.

13. Eisenberg VH, Weil C, Chodick G, Shalev V. Epidemiology of endometriosis: A large population-based database study from a health-care provider with 2 million members. BJOG. 2018 Jan;125(1):55–62. doi:10.1111/1471-0528.14711. Epub 2017 Jun 14. PMID: 28444957.

14. Wen X, Xiong Y, Qu X, et al. The risk of endometriosis after exposure to endocrine-disrupting chemicals: a meta-analysis of 30 epidemiology studies. Gynecol Endocrinol Off J Int Soc Gynecol Endocrinol. 2019;35(8):645-650. doi: 10.1080/09513590.2019.1590546.

15. Cramer DW, Wilson E, Stillman RJ, et al. The relation of endometriosis to menstrual characteristics, smoking, and exercise. JAMA. 1986;255(14):1904-1908.

16. Missmer SA, Cramer DW. The epidemiology of endometriosis. Obstet Gynecol Clin North Am. 2003;30(1):1-19, vii. doi: 10.1016/s0889-8545(02)00050-5.

17. Treloar SA, O'Connor DT, O'Connor VM, Martin NG. Genetic influences on endometriosis in an Australian twin sample. sueT@qimr.edu.au. Fertil Steril. 1999;71(4):701-710. doi: 10.1016/s0015-0282(98)00540-8.

18. Parazzini F, Esposito G, Tozzi L, Noli S, Bianchi S. Epidemiology of endometriosis and its comorbidi-ties. Eur J Obstet Gynecol Reprod Biol. 2017;209:3–7. doi:10.1016/j.ejogrb.2016.04.021.

19. Shigesi N, Kvaskoff M, Kirtley S, Feng Q, Fang H, Knight JC, Missmer SA, Rahmioglu N, Zondervan KT, Becker CM. The association between endometriosis and autoimmune diseases: A systematic review and meta-analysis. Hum Rep Update. July–August 2019;25(4):486–503. doi:10.1093/humupd/dmz014.

20. Hadfield R, Mardon H, Barlow D, Kennedy S. Delay and diagnosis of endometriosis: a survey of women from the USA and the UK. 1996; 11(4): 878-880. doi:10.1093/Oxfordjournals.humrep.a019270.

21. Ballard KD, Lowton K, Wright JT. What's the delay? A qualitative study of women's experiences of reaching a diagnosis of endometriosis. Fertil Steril 2006;86(5):1296–301.

22. Stratton P. The tangled web of reasons for the delay in diagnosis of endometriosis in women with chronic pelvic pain: will the suffering end? Fertil Steril. 2006; 86(5): 1302-1304. doi:10.1016/j.fertnstert.2006.06.044.

23. Arruda MS, Petta CA, Abrão MS, Benetti-Pinto CL. Time elapsed from onset of symptoms to diagnosis of endometriosis in a cohort study of Brazilian women. Hum Reprod. 2003 Apr;18(4):756-9. doi: 10.1093/humrep/deg136. PMID: 12660267

24. Audebert A, Lecointre L, Afors K, Koch A, Wattiez A, Akladios C. Adolescent Endometriosis: Report of a Series of 55 Cases With a Focus on Clinical Presentation and Long-Term Issues. J Minim Invasive Gynecol. 2015 Jul-Aug;22(5):834-40. doi: 10.1016/j.jmig.2015.04.001. Epub 2015 Apr 4. PMID: 25850071.

25. Greene R, Stratton P, Cleary SD, Ballweg ML, Sinaii N. Diagnostic experience among 4,334 women reporting surgically diagnosed endometriosis. Fertil Steril. 2009; 91(1): 32-39. doi:10.1016/j.fertnstert.2007.11.020.

26. IASP Subcommittee on Taxonomy. Pain terms: a list with definitions and notes on usage. Recommended by the IASP Subcommittee on Taxonomy. Pain. 1979;6(3):249-52.

27. Raja SN, Carr DB, Cohen M, Finnerup NB, Flor H, Gibson S, et al. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. Pain. 2020. doi:10.1097/j.pain.0000000000001939.

28. Zhou J, Chern BSM, Barton-Smith P, et al. Peritoneal fluid cytokines reveal new insights of endometriosis subphenotypes. Int J Mol Sci. 2020;21(10):3515. doi: 10.3390/ijms21103515.

29. Morotti M, Vincent K, Becker CM. Mechanisms of pain in endometriosis. Eur J Obstet Gynecol Reprod Biol. 2017;209:8-13. doi: 10.1016/j.ejogrb.2016.07.497.

30. Zheng P, Zhang W, Leng J, Lang J. Research on central sensitization of endometriosis-associated pain: a systematic review of the literature. J Pain Res. 2019;12:1447-1456. doi: 10.2147/JPR.S197667.

31. Avant RF. Dysmenorrhea. Prim Care. 1988 Sep;15(3):549-59. PMID: 3054962.

32. Dai Y, Luo H, Zhu L, Yang W, Xiang H, Shi Q, Jin P. Dysmenorrhea pattern in adolescences informing adult endometriosis. BMC Public Health. 2024 Feb 5;24(1):373. doi: 10.1186/s12889-024-17825-2. PMID: 38317119; PMCID: PMC10840152.

33. Ishikura IA, Hachul H, Pires GN, Tufik S, Andersen ML. The impact of primary dysmenorrhea on sleep and the consequences for adolescent academic performance. J Clin Sleep Med. 2020;16:467–468. doi: 10.5664/jcsm.8238.

34. Armour M, Parry K, Manohar N, Holmes K, Ferfolja T, Curry C, MacMillan F, Smith CA. The Prevalence and Academic Impact of Dysmenorrhea in 21,573 Young Women: A Systematic Review and Meta-Analysis. J Womens Health (Larchmt) 2019;28:1161–1171. doi: 10.1089/jwh.2018.7615.

35. Yu H, Li B, Li T, Zhang S, Lin X. Combination of noninvasive methods in diagnosis of infertile women with minimal or mild endometriosis, a retrospective study in China. Medicine (Baltimore). 2019 Aug;98(31):e16695. doi: 10.1097/

MD.0000000000016695. PMID: 31374059; PMCID: PMC6709301.

36. Konrad L, Fruhmann Berger LM, Maier V, Horné F, Neuheisel LM, Laucks EV, Riaz MA, Oehmke F, Meinhold-Heerlein I, Zeppernick F. Predictive Model for the Non-Invasive Diagnosis of Endometriosis Based on Clinical Parameters. J Clin Med. 2023 Jun 23;12(13):4231. doi: 10.3390/jcm12134231. PMID: 37445265; PMCID: PMC10342998.

37. Rogers R.G., Pauls R.N., Thakar R., Morin M., Kuhn A., Petri E., Fatton B., Whitmore K., Kingsberg S.A., Lee J. An international Urogynecological association (IUGA)/international continence society (ICS) joint report on the terminology for the assessment of sexual health of women with pelvic floor dysfunction. Int. Urogynecol. J. 2018;29:647–666. doi: 10.1007/s00192-018-3603-9.

38. Mabrouk M., Del Forno S., Spezzano A., Raimondo D., Arena A., Zanello M., Leonardi D., Paradisi R., Seracchioli R. Painful Love: Superficial Dyspareunia and Three Dimensional Transperineal Ultrasound Evaluation of Pelvic Floor Muscle in Women with Endometriosis. J. Sex Marital. Ther. 2019:1–10. doi: 10.1080/0092623X.2019.1676852.

39. Ferrero S., Esposito F., Abbamonte L.H., Anserini P., Remorgida V., Ragni N. Quality of sex life in women with endometriosis and deep dyspareunia. Fertil. Steril. 2005;83:573–579. doi: 10.1016/j.fertnstert.2004.07.973.

40. Roman H, Ness J, Suciu N, Bridoux V, Gourcerol G, Leroi AM, Tuech JJ, Ducrotté P, Savoye-Collet C, Savoye G. Are digestive symptoms in women presenting with pelvic endometriosis specific to lesion localizations? A preliminary prospective study. Hum Reprod. 2012 Dec;27(12):3440-9. doi: 10.1093/humrep/des322. Epub 2012 Sep 7. PMID: 22962316.

41. Seracchioli R, Mabrouk M, Guerrini M, Manuzzi L, Savelli L, Frascà C, Venturoli S. Dyschezia and posterior deep infiltrating endometriosis: analysis of 360 cases. J Minim Invasive Gynecol. 2008 Nov-Dec;15(6):695-9. doi: 10.1016/j.jmig.2008.07.005. PMID: 18971131.

42. Razzaghi MR, Rahjoo T, Golshan A. Endometriosis with pure urinary symptoms. Urol J. 2009 Spring;6(2):132-4. PMID: 19472135.

43. Knabben L, Imboden S, Fellmann B, Nirgianakis K, Kuhn A, Mueller MD. Urinary tract endometriosis in patients with deep infiltrating endometriosis: prevalence, symptoms, management, and proposal for a new clinical classification. Fertil Steril. 2015 Jan;103(1):147-52. doi: 10.1016/j.fertnstert.2014.09.028. Epub 2014 Oct 28. PMID: 25439849.

44. Kolodziej A, Krajewski W, Dolowy L., Hirnle L. Urinary Tract Endometriosis. Urology Journal, 2015;12(4):2213–2217. https://doi.org/10.22037/uj.v12i4.2838.

45. Fadhlaoui A, Gillon T, Lebbi I, Bouquet de Jolinière J, Feki A. Endometriosis and Vesico-Sphincteral Disorders. Front Surg. 2015 Jun 22;2:23. doi: 10.3389/fsurg.2015.00023. PMID: 26157800; PMCID: PMC4476201.

46. Campin L, Borghese B, Marcellin L, Santulli P, Bourret A, Chapron C. Troubles fonctionnels urinaires liés à l'endométriose profonde et à son traitement : revue de la littérature [Urinary functional disorders bound to deep endometriosis and to its treatment: review of the literature]. J Gynecol Obstet Biol Reprod (Paris). 2014 Jun;43(6):431-42. French. doi: 10.1016/j.jgyn.2014.03.003. Epub 2014 May 13. PMID: 24831568.

47. Moore J, Kennedy S. Causes of chronic pelvic pain. Baillieres Best Pract Res Clin Obstet Gynaecol. 2000 Jun;14(3):389-402. doi: 10.1053/beog.1999.0082. PMID: 10962633.

48. Ozawa Y, Murakami T, Terada Y, Yaegashi N, Okamura K, Kuriyama S, Tsuji I. Management of the pain associated with endometriosis: an update of the painful problems. Tohoku J Exp Med. 2006 Nov;210(3):175-88. doi: 10.1620/tjem.210.175. PMID: 17077594.

49. Hsu AL, Sinaii N, Segars J, Nieman LK, Stratton P. Relating pelvic pain location to surgical findings of endometriosis. Obstet Gynecol. 2011;118(2 Pt 1):223–230. doi: 10.1097/AOG.0b013e-318223fed0.

50. Latremoliere A, Woolf CJ. Central sensitization: a generator of pain hypersensitivity by central neural plasticity. J Pain. 2009;10(9):895–926. doi: 10.1016/j.jpain.2009.06.012.

51. Ek M., Roth B., Ekstrom P., Valentin L., Bengtsson M., Ohlsson B. Gastrointestinal symptoms among endometriosis patients—A case-cohort study. BMC Womens Health. 2015;15:59. doi: 10.1186/s12905-015-0213-2.

52. Issa B., Onon T.S., Agrawal A., Shekhar C., Morris J., Hamdy S., Whorwell P.J. Visceral hypersensitivity in endometriosis: A new target for treatment? Gut. 2012;61:367–372. doi: 10.1136/gutjnl-2011-300306.

53. Schlicke CP. Ectopic endometrial tissue in the thigh. J Am Med Assoc. 1946 Oct 26;132:445. doi: 10.1001/jama.1946.02870430025008. PMID: 20999676.

54. Possover M., Forman A., Rabischong B., Lemos N., Chiantera V. Neuropelveology: New Groundbreaking Discipline in Medicine. J. Minim. Invasive Gynecol. 2015;22:1140–1141. doi: 10.1016/j.jmig.2015.06.009.

55. Nezhat C, Nezhat F, Nezhat C. Endometriosis: Ancient disease, ancient treatments. Fertil Steril (2012) 98:6S. doi: 10.1016/j.fertnstert.2012.08.001

56. Leone Roberti Maggiore U, Chiappa V, Ceccaroni M, Roviglione G, Savelli L, Ferrero S, Raspagliesi F, Spanò Bascio L. Epidemiology of infertility in women with endometriosis. Best Pract Res Clin Obstet Gynaecol. 2024 Feb;92:102454. doi: 10.1016/j.bpobgyn.2023.102454. Epub 2024 Jan 3. PMID: 38183767.

57. Gerlinger C., Schumacher U., Wentzeck R., Uhl-Hochgräber K., Solomayer E.F., Schmitz H., Faustmann T., Seitz C. How can we measure endometriosis-associated pelvic pain? J. Endometr. 2012;4:109–116. doi: 10.5301/JE.2012.9725.

58. Thong I.S.K., Jensen M.P., Miro J., Tan G. The validity of pain intensity measures: What do the NRS, VAS, VRS, and FPS-R measure? Scand. J. Pain. 2018;18:99–107. doi: 10.1515/sjpain-2018-0012.

59. Della Corte L, Di Filippo C, Gabrielli O, Reppuccia S, La Rosa VL, Ragusa R, Fichera M, Commodari E, Bifulco G, Giampaolino P. The Burden of Endometriosis on Women's Lifespan: A Narrative Overview on Quality of Life and Psychosocial Wellbeing. Int J Environ Res Public Health. 2020 Jun 29;17(13):4683. doi: 10.3390/ijerph17134683. PMID: 32610665; PMCID: PMC7370081.

60. Hudelist G, Oberwinkler KH, Singer CF, Tuttlies F, Rauter G, Ritter O, Keckstein J. Combination of transvaginal sonography and clinical examination for preoperative diagnosis of pelvic endometriosis. Hum Reprod. 2009 May;24(5):1018-24. doi: 10.1093/humrep/dep013. Epub 2009 Feb 6. PMID: 19202143.

61. Hudelist G, Oberwinkler KH, Singer CF, Tuttlies F, Rauter G, Ritter O, Keckstein J. Combination of transvaginal sonography and clinical examination for preoperative diagnosis of pelvic endometriosis. Hum Reprod. 2009 May;24(5):1018-24. doi: 10.1093/humrep/dep013. Epub 2009 Feb 6. PMID: 19202143.

62. Pascoal E, Wessels JM, Aas-Eng MK, Abrao MS, Condous G, Jurkovic D, Espada M, Exacoustos C, Ferrero S, Guerriero S, Hudelist G, Malzoni M, Reid S, Tang S, Tomassetti C, Singh SS, Van den Bosch T, Leonardi M. Strengths and limitations of diagnostic tools for endometriosis and relevance in diagnostic test accuracy research. Ultrasound Obstet Gynecol. 2022 Sep;60(3):309-327. doi: 10.1002/uog.24892. PMID: 35229963.

63. Akobeng AK. Understanding diagnostic tests 1: sensitivity, specificity and predictive values. Acta Paediatr. 2007 Mar;96(3):338-41. doi: 10.1111/j.1651-2227.2006.00180.x. PMID: 17407452.

64. Bossuyt PM, Reitsma JB, Bruns DE, Gatsonis CA, Glasziou PP, Irwig L, Lijmer JG, Moher D, Rennie D, de Vet HC, Kressel HY, Rifai N, Golub RM, Altman DG, Hooft L, Korevaar DA, Cohen JF; STARD Group. STARD 2015: An Updated List of Essential Items for Reporting Diagnostic Accuracy Studies. Clin Chem. 2015 Dec;61(12):1446-52. doi: 10.1373/clinchem.2015.246280. Epub 2015 Oct 28. PMID: 26510957.

65. Wykes CB, Clark TJ, Khan KS. Accuracy of laparoscopy in the diagnosis of endometriosis: a systematic quantitative review. BJOG. 2004 Nov;111(11):1204-12. doi: 10.1111/j.1471-0528.2004.00433.x. PMID: 15521864.

66. Giudice LC, Oskotsky TT, Falako S, Opoku-Anane J, Sirota M. Endometriosis in the era of precision medicine and impact on sexual and reproductive health across the lifespan and in diverse populations. FASEB J. 2023 Sep;37(9):e23130. doi: 10.1096/fj.202300907. PMID: 37641572; PMCID: PMC10503213.

67. Guerriero S, Condous G, van den Bosch T, Valentin L, Leone FP, Van Schoubroeck D, Exacoustos C, Installé AJ, Martins WP, Abrao MS, Hudelist G, Bazot M, Alcazar JL, Gonçalves MO, Pascual MA, Ajossa S, Savelli L, Dunham R, Reid S, Menakaya U, Bourne T, Ferrero S, Leon M, Bignardi T, Holland T, Jurkovic D, Benacerraf B, Osuga Y, Somigliana E, Timmerman D. Systematic approach to sonographic evaluation of the pelvis in women with suspected endometriosis, including terms, definitions and measurements: a consensus opinion from the International Deep Endometriosis Analysis (IDEA) group. Ultrasound Obstet Gynecol. 2016 Sep;48(3):318-32. doi: 10.1002/uog.15955. Epub 2016 Jun 28. PMID: 27349699.

68. Nisenblat V, Bossuyt PM, Farquhar C, Johnson N, Hull ML. Imaging modalities for the non-invasive diagnosis of endometriosis. Cochrane Database Syst Rev. 2016 Feb 26;2(2):CD009591. doi: 10.1002/14651858.CD009591.pub2. PMID: 26919512; PMCID: PMC7100540.

69. Bazot M, Daraï E. Diagnosis of deep endometriosis: clinical examination, ultrasonography, magnetic resonance imaging, and other techniques. Fertil Steril. 2017 Dec;108(6):886-894. doi: 10.1016/j.fertnstert.2017.10.026. PMID: 29202963.

70. Keckstein J, Saridogan E, Ulrich UA, Sillem M, Oppelt P, Schweppe KW, Krentel H, Janschek E, Exacoustos C, Malzoni M, Mueller M, Roman H, Condous G, Forman A, Jansen FW, Bokor A, Simedrea V, Hudelist G. The #Enzian classification: A comprehensive non-invasive and surgical description system for endometriosis. Acta Obstet Gynecol Scand. 2021 Jul;100(7):1165-1175. doi: 10.1111/aogs.14099. Epub 2021 Mar 19. PMID: 33483970.

71. Maciel C, Ferreira H, Djokovic D, Kyaw Tun J, Keckstein J, Rizzo S, Manganaro L. MRI of endometriosis in correlation with the #Enzian classification: applicability and structured report. Insights Imaging. 2023 Jul 5;14(1):120. doi: 10.1186/s13244-023-01466-x. PMID: 37405519; PMCID: PMC10323073.

72. Keckstein J, Hoopmann M. Endometriosis, ultrasound and #Enzian classification: the need for a common language for non-invasive diagnostics. Ultraschall Med. 2023 Jun;44(3):233-239. English, German. doi: 10.1055/a-2055-6712. Epub 2023 Jun 6. PMID: 37279767.