



IMAGING FINDINGS IN PELVIC ENDOMETRIOSIS: A COMPARATIVE STUDY OF ULTRASOUND AND MRI

Radiology

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ABSTRACT

Background: Endometriosis is a chronic gynecological disorder affecting women of reproductive age, characterized by ectopic endometrial tissue outside the uterus. Imaging plays a crucial role in diagnosis and disease mapping. **Objectives:** To describe the spectrum of ultrasound and MRI findings in pelvic endometriosis and compare the diagnostic performance of both modalities. **Materials And Methods:** This cross-sectional study included 35 patients aged 20-50 years with clinical suspicion of endometriosis. All underwent transvaginal ultrasound (TVS) followed by pelvic MRI. Imaging findings were assessed for ovarian endometriomas, deep infiltrating endometriosis (DIE), and correlated with CA-125 levels. **Results:** Most patients were in the 30-39 year age group (65.7%). Dysmenorrhea was the most common symptom (48.6%). Ovarian endometriomas were detected in 28 patients (80%), showing ground-glass echogenicity on TVS and T1 hyperintensity with T2 shading on MRI. DIE was present in 8 patients (22.9%); MRI detected all cases (100%) versus TVS (87.5%). Restricted sliding sign on TVS showed 87.5% sensitivity and 92.6% specificity for DIE. Mean CA-125 was higher in advanced disease (121.5 ± 41.3 U/mL) versus isolated endometriomas (53.6 ± 8.2 U/mL). **Conclusion:** TVS is effective for ovarian endometriomas, while MRI is superior for DIE evaluation. Combined use of both modalities improves diagnostic accuracy.

KEYWORDS

Endometriosis, Deep Infiltrating Endometriosis, Transvaginal Ultrasound, MRI, CA-125

INTRODUCTION

Endometriosis is a chronic estrogen-dependent condition affecting approximately 10% of reproductive-age women, causing dysmenorrhea, chronic pelvic pain, and infertility [1]. Clinical examination is often insufficient, leading to diagnostic delays of 7-10 years [2]. Transvaginal sonography (TVS) and magnetic resonance imaging (MRI) are the cornerstone imaging modalities [3]. TVS allows real-time dynamic assessment, while MRI offers superior soft-tissue contrast for deep infiltrating endometriosis (DIE) [4]. This study aims to describe the spectrum of imaging findings and compare the diagnostic performance of both modalities.

MATERIALS AND METHODS:

This cross-sectional study was conducted in the Department of Radiodiagnosis at Sri Siddhartha Medical College & Hospital, Tumkur, over eighteen months. Ethical clearance was obtained, and written informed consent was secured from all participants.

Thirty-five patients aged 20-50 years with clinical suspicion of endometriosis were enrolled. Exclusion criteria included other causes of chronic pelvic pain and MRI contraindications. Sample size was calculated as 35 based on 91% imaging specificity and 10% prevalence.

All patients underwent TVS (GE Voluson S8 Core) followed by pelvic MRI (Siemens Essenza 1.5T) with T1, T2, T1 fat-sat, and DWI sequences. Data were analyzed using SPSS version 20; $p < 0.05$ was considered significant.

RESULTS

Demographic And Clinical Profile

Among the 35 patients, the majority were aged 30-39 years (60%), followed by 20-29 years (25.7%) and 40-49 years (14.3%). Nearly half were nulliparous (48.6%), while 51.4% were parous. Primary infertility was present in 62.9% of cases. Dysmenorrhea was the most common presenting symptom (48.6%), with 14.3% reporting severe dysmenorrhea. Dyspareunia/dyschezia was seen in 17.1%, chronic pelvic pain in 14.3%, and cyclic urinary symptoms in 5.7% of patients.

Imaging Findings

Ovarian Endometriomas: Detected in 28 patients (80%). TVS showed characteristic ground-glass echogenicity with peripheral Doppler flow. MRI demonstrated T1 hyperintensity with fat-

suppressed persistence in all cases (100%) and T2 shading in 89.3% (Table 1).

Table 1: Table 2: MRI Features Of Ovarian Endometriomas

Feature	n (%)
T1 hyperintensity	28 (100)
T1 fat-suppressed persistence	28 (100)
T2 shading	25 (89.3)
No T2 shading	3 (10.7)

Deep Infiltrating Endometriosis: Present in 8 patients (22.9%). MRI detected all cases (100%) versus TVS (87.5%). Site distribution is shown in Table 2.

Table 2 : DIE Site Distribution On MRI (n = 8)

Site	n (%)
Uterosacral ligaments	2 (25.0)
Rectovaginal septum	2 (25.0)
Rectosigmoid colon	2 (25.0)
Bladder	2 (25.0)

Sliding Sign Performance: Restricted sliding sign on TVS showed 87.5% sensitivity, 92.6% specificity, and 91.4% accuracy for DIE detection (Table 3).

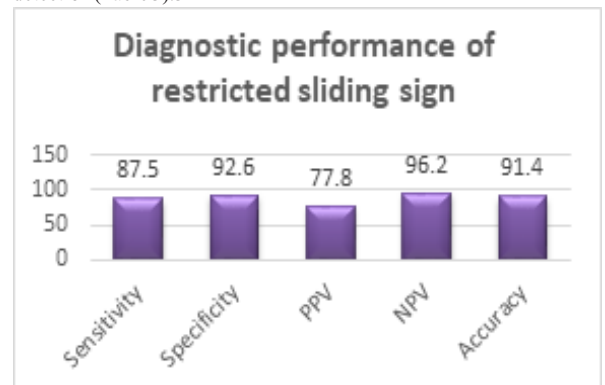


Figure 1: Bar Chart Showing The Diagnostic Performance Of Restricted Sliding Sign On Transvaginal Ultrasound For Detection Of Deep Infiltrating Endometriosis

Table 3: Diagnostic Performance Of Restricted Sliding Sign

Metric	Value
Sensitivity	87.5%
Specificity	92.6%
PPV	77.8%
NPV	96.2%
Accuracy	91.4%

Adenomyosis: Associated adenomyosis was seen in 5 patients (14.3%), with junctional zone thickness >12 mm in all cases.

Ovarian Mimics: Four patients (11.4%) had lesions mimicking endometriomas on TVS (hemorrhagic cyst, dermoid, mucinous cystadenoma, TOA), correctly differentiated by MRI.

CA-125 Correlation

Mean CA-125 levels increased with disease severity: isolated endometrioma (53.6 ± 8.2 U/mL), endometrioma + adenomyosis (82.3 ± 10.1 U/mL), and DIE (149.2 ± 28.5 U/mL).

Final Diagnosis

Final imaging diagnoses included isolated endometrioma (48.6%), endometrioma + DIE (17.1%), endometrioma + adenomyosis (14.3%), isolated DIE (5.7%), superficial peritoneal endometriosis (2.9%), and mimics (11.4%).

DISCUSSION

The predominance of endometriosis in the 30-39 year age group (65.7%) aligns with established epidemiology [1]. Primary infertility in 62.9% reflects the well-recognized association between endometriosis and impaired fertility due to pelvic adhesions and chronic inflammation [5].

TVS detected ovarian endometriomas in 80% with characteristic ground-glass echogenicity, consistent with Van Holsbeke et al. [6]. Peripheral Doppler pattern helped exclude malignancy [7]. The sliding sign demonstrated good sensitivity (87.5%) and specificity (92.6%) for DIE, comparable to Reid et al. [8].

MRI accurately characterized all endometriomas with T1 hyperintensity and fat-suppressed persistence—the most reliable MRI feature [9]. T2 shading in 89.3% matches Togashi et al.'s reported range [10]. MRI's superiority for DIE detection (100% vs. 87.5%) aligns with Bazot et al. [11] and Abrao et al. [12].

MRI successfully differentiated all four ovarian mimics, confirming its problem-solving role [13]. The association between elevated CA-125 and advanced disease supports its use as an adjunctive severity marker [14]. Superficial peritoneal endometriosis remained undetectable by both modalities, a known limitation [15].

CONCLUSION

TVS is an effective first-line modality for ovarian endometriomas, while MRI is indispensable for comprehensive evaluation of deep infiltrating endometriosis. The sliding sign serves as a useful screening tool for DIE, but MRI remains definitive for diagnosis and disease mapping. Combined use of both modalities provides optimal diagnostic accuracy and guides appropriate management of pelvic endometriosis.

REFERENCES:

- [1] Chaggar P, Tellum T, Thanatsis N, et al. Prevalence of deep and ovarian endometriosis in women attending a general gynecology clinic. *Ultrasound Obstet Gynecol.* 2023;61(5):632-641.
- [2] Horne AW, Missmer SA. Pathophysiology, diagnosis, and management of endometriosis. *BMJ.* 2022;379:e070750.
- [3] Collins BG, Ankola A, Gola S, McGillen KL. Transvaginal US of endometriosis: looking beyond the endometrioma. *Radiographics.* 2019;39(5):1549-1568.
- [4] Kido A, Himoto Y, Moribata Y, et al. MRI in the diagnosis of endometriosis and related diseases. *Korean J Radiol.* 2022;23(4):426-445.
- [5] Giudice LC, Kao LC. Endometriosis and infertility: mechanisms and management. *Lancet.* 2004;364(9447):1789-1799.
- [6] Van Holsbeke C, Van Calster B, Guerriero S, et al. Endometriomas: their ultrasound characteristics. *Acta Obstet Gynecol Scand.* 2010;89(2):191-202.
- [7] Guerriero S, Ajossa S, Gerada M, et al. Transvaginal ultrasonography combined with CA-125 in diagnosis of endometrioma. *Fertil Steril.* 2018;110(5):939-958.
- [8] Reid S, Condous G. Transvaginal sonographic sliding sign: prediction of pouch of Douglas obliteration. *Ultrasound Obstet Gynecol.* 2013;41(5):605-607.
- [9] Siegelman ES, Oliver ER. MR imaging of endometriosis: ten imaging pearls. *Radiographics.* 2012;32(6):1675-1691.
- [10] Togashi K, Nishimura K, Kimura I, et al. Endometrial cysts: diagnosis with MR imaging. *Radiology.* 1991;180(1):73-78.
- [11] Bazot M, Lafont C, Rouzier R, et al. Diagnostic accuracy of physical examination, TVS, rectal endoscopic sonography, and MRI for deep infiltrating endometriosis. *Fertil Steril.* 2009;92(6):1825-1833.
- [12] Abrao MS, Gonçalves MO, Dias JA Jr, et al. Comparison between clinical examination, TVS and MRI for diagnosis of deep endometriosis. *Fertil Steril.* 2007;88(6):1569-1573.
- [13] Chamié LP, Blasbalg R, Pereira RMA, et al. Findings of pelvic endometriosis at transvaginal US, MR imaging, and laparoscopy. *Radiographics.* 2011;31(4):E77-100.
- [14] Nisenblat V, Bossuyt PM, Shaikh R, et al. Blood biomarkers for non-invasive diagnosis of endometriosis. *Cochrane Database Syst Rev.* 2016;(2):CD012179.
- [15] Bazot M, Darai E. Diagnosis of deep endometriosis: clinical examination, ultrasonography, MRI. *Fertil Steril.* 2017;108(6):886-894.