



IMAGING–HISTOPATHOLOGICAL CORRELATION OF ENDOMETRIAL HYPERPLASIA AND ENDOMETRIAL CARCINOMA

Dr. Ashirwad Pasumarthy¹, Dr. Tinaimeiru Golmei², Dr. K Raghavendar Babu³

¹Associate Professor, Department of Radiology, Maheshwara Medical College and Hospital, Patancheru, Telangana, India. ashirwad000@gmail.com

²Associate Professor, Department of Radiology, Maheshwara Medical College and Hospital, Patancheru, Telangana, India. tinagolmei@gmail.com

³Associate Professor, Department of Radiology, Maheshwara Medical College and Hospital, Patancheru, Telangana, India. draghun.rad@gmail.com

Corresponding Author

Dr.Ashirwad Pasumarthy

Associate Professor, Department of Radiology, Maheshwara Medical College and Hospital, Patancheru, Telangana, Email - ashirwad000@gmail.com

Abstract

Background: Endometrial hyperplasia and endometrial carcinoma are important causes of abnormal uterine bleeding. Transvaginal ultrasound (TVUS) provides initial assessment of endometrial thickness and morphology, while MRI can characterize local extent and myometrial invasion in suspected carcinoma.

Aim: To evaluate the correlation between endometrial imaging findings and histopathological diagnosis in women undergoing endometrial sampling or hysterectomy.

Methods: One hundred women with abnormal uterine bleeding or imaging suspicion of endometrial pathology were evaluated using TVUS; MRI was performed in selected women with suspected or confirmed carcinoma. Endometrial thickness, morphology, focal lesions, vascularity, myometrial interface and cervical extension were recorded.

Results: Mean age was 55.2 ± 10.7 years. Postmenopausal bleeding was present in 48%, heavy/prolonged menstrual bleeding in 39% and intermenstrual bleeding in 13%. Histopathology showed benign/atrophic endometrium in 23%, hyperplasia without atypia in 25%, atypical hyperplasia/EIN in 17% and endometrial carcinoma in 35%. Mean endometrial thickness increased from 6.2 mm in benign/atrophic endometrium to 19.6 mm in carcinoma. Among 24 carcinoma patients undergoing MRI, concordance for superficial versus deep myometrial invasion was 87.5%.

Conclusion: TVUS is useful for initial detection and risk stratification of endometrial pathology, while MRI provides complementary local staging information in suspected carcinoma. Histopathology remains essential for definitive diagnosis and grading.

Keywords: endometrial hyperplasia; endometrial carcinoma; transvaginal ultrasound; MRI; endometrial thickness; histopathology; abnormal uterine bleeding.

Introduction

Endometrial hyperplasia represents a spectrum of proliferative endometrial abnormalities and may precede endometrial carcinoma. Current classification emphasizes atypia and endometrial intraepithelial neoplasia (EIN) as a premalignant lesion.[1–6]

Endometrial carcinoma commonly presents with abnormal uterine bleeding, particularly postmenopausal bleeding. Early evaluation permits tissue diagnosis and, when carcinoma is identified, appropriate staging and treatment.[7–12]

TVUS is generally the first-line imaging examination in women with abnormal uterine bleeding. Endometrial thickness is important, especially in postmenopausal women, but thickness alone cannot reliably distinguish hyperplasia from carcinoma. Morphology, focal lesions, vascularity and the endometrial–myometrial interface provide additional information.[9–15]

MRI has an established role in local staging of endometrial carcinoma, particularly assessment of myometrial invasion, cervical stromal involvement and extrauterine disease. Diffusion-weighted imaging can improve lesion conspicuity.[13–19]

Histopathological examination remains the definitive diagnostic method. Differences between biopsy/curettage and hysterectomy pathology may occur because of sampling limitations and tumor heterogeneity.[4–8,20]

This Radiology–Obstetrics & Gynaecology–Pathology collaborative study evaluates imaging findings against histopathological diagnoses in a 100-case.

2. Aim and Objectives

Aim: To assess the correlation between imaging findings and histopathological diagnosis in women with suspected endometrial hyperplasia or carcinoma.

- Describe the demographic and clinical profile.
- Document TVUS endometrial thickness and morphology.
- Assess focal lesions and Doppler vascularity.
- Evaluate association between endometrial thickness and histopathological category.
- Assess MRI findings in suspected/confirmed carcinoma.
- Correlate imaging diagnosis with histopathology.
- Compare imaging indicators of myometrial/cervical involvement with final pathology.
- Identify imaging–pathology discordance.

3. Materials and Methods

3.1 Study design

Hospital-based prospective observational study done on 100 women with abnormal uterine bleeding and suspected endometrial pathology.

3.2 Setting and period

Department of Radiology with Obstetrics & Gynaecology and Pathology, Maheshwara Medical College and Hospital, Telangana, India, from September 2021 to March 2022.

3.3 Sample size

100 women.

3.4 Inclusion criteria

Women aged ≥ 18 years with abnormal uterine bleeding or an endometrial abnormality on imaging who underwent endometrial sampling, hysteroscopy-directed biopsy, curettage or hysterectomy.

3.5 Exclusion criteria

Pregnancy, acute pelvic infection, previously treated carcinoma without pretreatment imaging, inadequate histopathology or uninterpretable ultrasound.

3.6 Clinical assessment

Age, menopausal status, bleeding pattern, parity, BMI, diabetes, hypertension and relevant medication/hormonal exposure were recorded.

3.7 TVUS

Endometrial thickness was measured in the sagittal plane at the thickest point, including both layers and excluding intracavitary fluid. Echogenicity, focal lesions, vascularity and the endometrial–myometrial interface were recorded.

3.8 MRI

Selected women underwent multiplanar T2-weighted MRI with diffusion-weighted and contrast-enhanced sequences when clinically indicated. Myometrial invasion, cervical involvement, serosal/extruterine extension and suspicious nodes were documented.

3.9 Histopathology

Biopsy/curettage or hysterectomy specimens were examined on H&E sections and categorized as benign/atrophic, hyperplasia without atypia, atypical hyperplasia/EIN and carcinoma. Carcinomas were further typed and graded.

3.10 Reference standard

Histopathology was the reference standard; final hysterectomy pathology was considered definitive when available.

3.11 Statistics

Continuous variables were summarized as mean $\pm$ SD and categorical variables as frequencies/percentages. Cross-tabulations were used for imaging–pathology correlation.

3.12 Ethics

Institutional Ethics Committee approval and appropriate informed consent was obtained and documented.

4. Results

The cohort comprised 100 women. Mean age was 55.2 ± 10.7 years. Postmenopausal bleeding was the most common presentation. Histopathology demonstrated benign/atrophic endometrium in 23, hyperplasia without atypia in 25, atypical hyperplasia/EIN in 17 and carcinoma in 35 women.

Table 1. Demographic profile (n=100)

Variable	Number (%) / value
----------	--------------------

Mean age	55.2 ± 10.7 years
18–39 years	8 (8%)
40–49 years	21 (21%)
50–59 years	32 (32%)
60–69 years	25 (25%)
≥70 years	14 (14%)
Postmenopausal	56 (56%)
Perimenopausal	17 (17%)
Premenopausal	27 (27%)
Mean BMI	27.1 ± 4.8 kg/m ²

Table 2. Clinical presentation

Clinical feature	Number (%)
Postmenopausal bleeding	48 (48%)
Heavy/prolonged menstrual bleeding	39 (39%)
Intermenstrual bleeding	13 (13%)
Pelvic pain/pressure	19 (19%)
Anemia	31 (31%)
Diabetes mellitus	24 (24%)
Hypertension	37 (37%)
Obesity, BMI ≥30	29 (29%)

Table 3. Histopathological diagnosis

Diagnosis	Number (%)
Benign/atrophic endometrium	23 (23%)
Hyperplasia without atypia	25 (25%)
Atypical hyperplasia / EIN	17 (17%)
Endometrioid carcinoma	29 (29%)
Non-endometrioid carcinoma	6 (6%)
Total	100 (100%)

Table 4. Endometrial thickness on TVUS

Thickness	Number (%)
≤4 mm	13 (13%)
>4–8 mm	22 (22%)
>8–11 mm	19 (19%)
>11–15 mm	21 (21%)
>15 mm	25 (25%)
Mean	13.7 ± 7.1 mm

Table 5. Mean endometrial thickness by histopathology

Diagnosis	Mean thickness
Benign/atrophic	6.2 ± 2.9 mm
Hyperplasia without atypia	11.4 ± 4.2 mm
Atypical hyperplasia/EIN	14.8 ± 5.1 mm
Carcinoma	19.6 ± 6.4 mm

Table 6. Sonographic morphology

Feature	Number (%)
Homogeneous endometrium	26 (26%)
Heterogeneous endometrium	46 (46%)
Focal polypoid/irregular thickening	38 (38%)
Irregular endometrial–myometrial interface	31 (31%)
Intracavitary fluid	14 (14%)
Increased endometrial vascularity	43 (43%)
Focal vascular stalk	11 (11%)
Suspected myometrial invasion	24 (24%)

Table 7. TVUS impression

Impression	Number (%)
Benign/atrophic	22 (22%)
Hyperplasia likely	27 (27%)
Atypia/EIN suspected	15 (15%)
Carcinoma suspected	36 (36%)

Table 8. TVUS impression versus histopathology

TVUS	Benign	Hyperplasia	Atypia/EIN	Carcinoma	Total
Benign/atrophic	18	3	1	0	22
Hyperplasia likely	5	18	3	1	27
Atypia/EIN suspected	0	3	9	3	15
Carcinoma suspected	0	1	4	31	36
Total	23	25	17	35	100

Table 9. MRI findings in carcinoma patients (n=24)

MRI feature	Number (%)
No/deep invasion absent	8 (33.3%)
<50% myometrial invasion	9 (37.5%)
≥50% invasion	7 (29.2%)
Cervical stromal involvement	5 (20.8%)
Suspicious nodes	4 (16.7%)

Serosal/extrauterine extension	3 (12.5%)
--------------------------------	-----------

Table 10. MRI invasion assessment versus final pathology

MRI	Pathology superficial	Pathology deep	Total
Superficial/no deep invasion	7	1	8
Deep invasion suspected	2	14	16
Total	9	15	24

Table 11. Histologic type and grade of carcinoma

Type/grade	Number (%)
Endometrioid grade 1	16 (45.7%)
Endometrioid grade 2	9 (25.7%)
Endometrioid grade 3	4 (11.4%)
Serous carcinoma	3 (8.6%)
Clear cell carcinoma	2 (5.7%)
Carcinosarcoma/other high-grade	1 (2.9%)
Total	35 (100%)

Table 12. Thickness category versus significant pathology

Thickness	Atypia/EIN + carcinoma	Benign + hyperplasia without atypia
≤4 mm	0	13
>4–8 mm	5	17
>8–11 mm	10	9
>11–15 mm	12	9
>15 mm	25	0
Total	52	48

Table 13. Biopsy versus hysterectomy pathology in carcinoma cases

Parameter	Concordant	Discordant	Concordance
Carcinoma present/absent	31	4	88.6%
Histologic type	30	5	85.7%
Grade category	27	8	77.1%

Table 14. Imaging–histopathological concordance

Parameter	Concordant	Discordant	Concordance
Broad diagnostic category	76	24	76.0%
Carcinoma suspicion on TVUS	90	10	90.0%

Thickness category	79	21	79.0%
MRI invasion category (n=24)	21	3	87.5%

Endometrial thickness increased progressively from benign/atrophic endometrium to hyperplasia, atypical hyperplasia/EIN and carcinoma. TVUS raised suspicion of carcinoma in 36 women, of whom 31 had carcinoma on histopathology. Among 24 carcinoma patients undergoing MRI, the concordance for superficial versus deep myometrial invasion was 87.5%.

5. Discussion

Abnormal uterine bleeding is the principal clinical trigger for endometrial evaluation. Postmenopausal bleeding was the most frequent presentation in this cohort, supporting its importance as a warning symptom.[7–12]

TVUS provides rapid assessment of endometrial thickness and morphology. However, thickness should not be interpreted in isolation because benign proliferative states and focal lesions can produce substantial thickening.[9–15]

The progressive increase in mean endometrial thickness across diagnostic categories supports its value for risk stratification, but overlap between hyperplasia and carcinoma means that tissue diagnosis remains essential.

Heterogeneity, irregular endometrial–myometrial interface and increased vascularity were common in significant pathology. These are suspicious findings rather than pathognomonic criteria.

Imaging–pathology discordance occurred in a proportion of cases. Some hyperplasia/EIN cases were categorized as carcinoma and some carcinomas as hyperplasia, demonstrating why ultrasound cannot replace endometrial sampling.

MRI is principally a staging examination for endometrial carcinoma. Assessment of myometrial invasion and cervical/extrauterine extension can influence surgical planning.[13–19] The study of MRI subgroup demonstrated good concordance with final pathology.

Biopsy/curettage and hysterectomy pathology can differ because of sampling limitations and tumor heterogeneity. Careful communication between radiology, gynecology and pathology is therefore important.[4–8,20]

A standardized reporting pathway should communicate endometrial thickness, morphology, focal lesions, vascularity, myometrial interface and relevant MRI staging findings. This allows the gynecologist to select appropriate tissue sampling and surgical planning.

Future studies should include larger cohorts, standardized ultrasound and MRI protocols, blinded image interpretation and complete molecular/pathological classification where available.

6. Strengths

- Radiology–OBG–Pathology collaborative design.
- Direct imaging–histopathology comparison.
- Assessment of morphology in addition to endometrial thickness.
- Dedicated MRI subgroup for local staging.
- Structured tables and reporting proforma.

7. Limitations

- MRI was performed selectively, creating potential selection bias.
- Sampling pathology may differ from final hysterectomy pathology.
- Thickness thresholds alone cannot distinguish all hyperplasia from carcinoma.

8. Conclusion

TVUS is a valuable first-line examination in women with abnormal uterine bleeding and suspected endometrial pathology. Increased thickness, heterogeneity, irregular endometrial–myometrial interface and abnormal vascularity are useful warning features but do not replace histopathological diagnosis. MRI provides complementary information regarding myometrial invasion and local extent in suspected endometrial carcinoma. A coordinated Radiology–OBG–Pathology approach can improve diagnostic characterization and preoperative planning.

References

1. Mutter GL. Endometrial intraepithelial neoplasia (EIN): will it bring order to chaos? *Gynecol Oncol.* 2000;76:287–290.
2. Mutter GL, Kauderer J, Baak JPA, Alberts D. Biopsy histomorphology predicts uterine endometrioid carcinoma survival. *Mod Pathol.* 2008;21:590–599.
3. Sanderson PA, Critchley HOD, Williams ARW, Arends MJ, Saunders PTK. New concepts for an old problem: the diagnosis of endometrial hyperplasia. *Hum Reprod Update.* 2012;23:232–254.
4. Lacey JV Jr, Chia VM. Endometrial hyperplasia and the risk of progression to carcinoma. *Semin Oncol.* 2011;38:1–10.
5. Trimble CL, Method M, Leitao M, et al. Management of endometrial precancers. *Obstet Gynecol.* 2012;120:1160–1175.
6. WHO Classification of Tumours Editorial Board. *Female Genital Tumours.* 5th ed. Lyon: IARC; 2000.
7. Bokhman JV. Two pathogenetic types of endometrial carcinoma. *Gynecol Oncol.* 1983;15:10–17.
8. Crosbie EJ, Kitson SJ, McAlpine JN, Mukhopadhyay A, Powell ME, Singh N. Endometrial cancer. *Lancet.* 2012;399:1412–1428.
9. Smith-Bindman R, Kerlikowske K, Feldstein VA, et al. Endovaginal ultrasound to exclude endometrial cancer and other endometrial abnormalities. *JAMA.* 1998;280:1510–1517.
10. Timmermans A, Opmeer BC, Khan KS, et al. Endometrial thickness measurement for detecting endometrial cancer in women with postmenopausal bleeding. *Obstet Gynecol.* 2010;116:160–167.
11. Gupta JK, Chien PFW, Voit D, Clark TJ, Khan KS. Ultrasonographic endometrial thickness for diagnosing endometrial pathology in women with postmenopausal bleeding. *Ultrasound Obstet Gynecol.* 2002;20:150–155.
12. van Hanegem N, Breijer MC, Khan KS, et al. Diagnostic evaluation of the endometrium in postmenopausal bleeding. *Obstet Gynecol.* 2011;117:1010–1021.

13. Sala E, Rockall AG, Freeman SJ, Mitchell DG, Reinhold C. The added role of MR imaging in endometrial cancer. *Radiology*. 2013;267:530–542.
14. Nougaret S, Horta M, Sala E, et al. Endometrial cancer MRI staging: updated guidelines of the European Society of Urogenital Radiology. *Eur Radiol*. 2010;29:792–805.
15. Beddy P, O'Neill AC, Yamamoto AK, Addley HC, Reinhold C, Sala E. FIGO staging system for endometrial cancer: diagnostic value of MRI. *Radiographics*. 2012;32:241–258.
16. Sala E, Crawford R, Senior E, Shaw A, Simcock B, Arora A. MRI of malignant and premalignant endometrial lesions. *Clin Radiol*. 2007;62:921–931.
17. Haldorsen IS, Salvesen HB. What is the best preoperative imaging for endometrial cancer? *Curr Oncol Rep*. 2006;18:25.
18. Manfredi R, Mirk P, Maresca G, et al. Local-regional staging of endometrial carcinoma: MR imaging findings. *Radiology*. 2004;231:372–378.
19. Nougaret S, Lakhman Y, Vargas HA, et al. Endometrial cancer MRI staging: updated concepts. *Radiographics*. 2009;39:1855–1878.
20. Koskas M, Amant F, Mirza MR, Creutzberg CL. Cancer of the corpus uteri: 2021 update. *Int J Gynecol Obstet*. 2001;155 Suppl 1:45–60.