Journal of Surgical Radiology

Site: https://journalsurgrad.com/

ISSN Print 2156-213X| ISSN Online: 2156-4566 Volume: 05 Issue: 06 Open Access

Research Article

Magnetic Resonance Imaging in the Evaluation of Female Pelvic Mass Lesions: Diagnostic Accuracy, Characterization and Histopathological Correlation

Dr.Shibu[1],Dr.Rajashree[2],Dr.Bharath Chandran[3]

[1]Professor, Department of Radiodiagnosis, Sree Mookambika Institute of Medical Sciences

[2]Junior resident, Department of Radiodiagnosis, Sree Mookambika Institute of Medical Sciences

[3]Assistant Professor, Department of Radiodiagnosis, Sree Mookambika Institute of Medical Sciences

*Corresponding Author

Article History

Received: 27.05.2026

Revised: 02.05.2026

Accepted: 11.06.2026

Published: 30.06.2026

Citations:

Shibu,Rajashree., & Chandran, B. Magnetic resonance imaging in the evaluation of female pelvic mass lesions: Diagnostic accuracy, characterization and histopathological correlation.J Surg Radiol, V5(6) 446-455

Abstract: ***Introduction:*** Pelvic masses in females represent a heterogeneous group of gynecological and non-gynecological lesions. Ultrasonography (USG) is the primary imaging modality for evaluation; however, characterization and determination of lesion origin may be challenging in complex cases. Magnetic Resonance Imaging (MRI) offers superior soft tissue contrast and multiplanar capability, facilitating accurate lesion characterization and staging.**Aim:**To evaluate the diagnostic role of MRI in female pelvic masses and assess its effectiveness in lesion characterization, determination of site of origin, and differentiation of benign and malignant lesions with histopathological correlation.**Materials and Methods:**A retrospective observational study was performed on female patients presenting with clinically suspected pelvic masses. Patients underwent ultrasonography followed by MRI examination using a 1.5-Tesla scanner. MRI findings were analyzed for lesion location, morphology, internal composition, local invasion, lymphadenopathy, ascites, and distant metastasis. Histopathological diagnosis served as the reference standard wherever available.**Results**:The majority of pelvic masses occurred in women above 45 years of age. Adnexal lesions constituted the most common group of masses, with benign lesions accounting for approximately two-thirds of cases. Cystic lesions were predominantly adnexal in origin, whereas uterocervical lesions were mainly solid. Complex cystic ovarian masses demonstrated a significantly higher likelihood of malignancy. MRI accurately identified lesion origin and morphology in over 90% of cases and demonstrated excellent performance in detecting hemorrhagic lesions, dermoid cysts, lymphadenopathy, ascites, peritoneal implants, and local tumor invasion.**Conclusion**:MRI is a highly effective imaging modality for the evaluation of female pelvic masses. It provides superior characterization of adnexal and uterocervical lesions, facilitates differentiation between benign and malignant masses, and accurately assesses disease extent, thereby improving preoperative planning and patient management.

Keywords: Magnetic Resonance Imaging, Pelvic Mass, Adnexal Lesion, Ovarian Neoplasm, Uterine Mass, Histopathological Correlation

INTRODUCTION

Female pelvic masses encompass a wide spectrum of pathologies arising from the uterus, cervix, ovaries, fallopian tubes, urinary bladder, bowel, and supporting pelvic structures. Accurate characterization of these lesions is crucial for determining appropriate management and surgical planning.

Ultrasonography remains the first-line imaging modality because of its accessibility, low cost, and absence of ionizing radiation. Nevertheless, ultrasound may be limited by patient habitus, bowel gas interference, operator dependency, and restricted field of view. Complex adnexal lesions, large pelvic masses, and malignant neoplasms often require further evaluation.

Magnetic Resonance Imaging (MRI) has emerged as the preferred problem-solving modality due to its superior soft tissue contrast, multiplanar imaging capability, and excellent tissue characterization. MRI facilitates accurate determination of lesion origin, internal architecture, local extension, vascular involvement, lymph node status, and metastatic disease.

The present study evaluates the role of MRI in female pelvic masses and correlates imaging findings with histopathological diagnosis.

MATERIALS AND METHODS

Study Design

Retrospective observational study.

Study Population

Female patients presenting with clinically suspected pelvic masses and referred for MRI evaluation.

Inclusion Criteria

- Female patients with clinically suspected pelvic masses.
- Patients undergoing both ultrasonography and MRI evaluation.

Exclusion Criteria

- Non-genitourinary pelvic masses.
- Contraindications to MRI examination.

MRI Protocol

MRI examinations were performed using a 1.5 Tesla scanner. Imaging sequences included:

- Axial T1-weighted imaging
- Axial, sagittal and coronal T2-weighted imaging
- Fat-suppressed sequences
- Post-contrast sequences when indicated

Lesions were evaluated for:

- Site of origin
- Size
- Morphology
- Internal consistency
- Presence of fat
- Hemorrhagic components
- Septations
- Mural nodules
- Local invasion
- Lymphadenopathy
- Ascites
- Peritoneal implants
- Distant metastases

Histopathological examination was considered the reference standard wherever available.

Statistical Analysis

Data were analyzed using SPSS version 20.0. Descriptive statistics were expressed as frequency and percentage**.**

RESULTS

Age Distribution

Most pelvic masses were observed in women older than 45 years.

Table 1. Distribution of Pelvic Masses According to Internal Consistency

Internal Consistency	Number (%)
Cystic	13 (27.08)
Solid	18 (37.50)
Complex	15 (31.25)
Others	8 (16.67)

Distribution of Adnexal Lesions

Table 2. Distribution of Adnexal Masses

Type	Number (%)
Benign	32 (66.67)
Malignant	16 (33.33)
Total	48 (100)

Anatomical Origin of Lesions

Table 3. Anatomical Distribution of Pelvic Lesions

Origin	Number
Ovary	13
Uterus	10
Fallopian Tube	4
Broad Ligament	1
Urinary Bladder	2

Ovarian lesions represented the most common pelvic masses.

MRI Characteristics

- Adnexal lesions were predominantly cystic.
- Uterocervical lesions were predominantly solid.
- Complex cystic ovarian masses demonstrated a higher incidence of malignancy.
- MRI accurately identified lesion origin in over 90% of cases.
- MRI provided additional diagnostic information in nearly half of cases.

Additional MRI Findings

Finding	Number of Cases
Local invasion	10
Ascites	13
Peritoneal implants	6
Lymphadenopathy	3
Vascular encasement	1
Distant metastasis	1

DISCUSSION

MRI demonstrated superior diagnostic accuracy compared with ultrasonography in determining lesion origin and tissue characterization. The multiplanar capability of MRI enabled confident identification of adnexal, uterine, and cervical lesions even in large masses with distorted anatomy.

Adnexal lesions represented the most common category of pelvic masses. Benign lesions outnumbered malignant lesions; however, increasing lesion complexity, mural nodularity, thick septations, and solid components were strongly associated with malignancy.

MRI showed particular value in identifying:

- Dermoid cysts through fat detection
- Endometriomas through T2 shading
- Hemorrhagic cysts through characteristic signal patterns
- Ovarian torsion through twisted pedicle visualization
- Malignant ovarian neoplasms through enhancement characteristics and local invasion

In uterocervical lesions, MRI accurately demonstrated myometrial invasion, cervical extension, parametrial infiltration, and lymph node involvement, making it superior for preoperative staging.
These findings are consistent with previous studies reporting MRI sensitivity approaching 95–100% and specificity ranging from 88–100% for characterization of female pelvic masses.

Limitations

- Single-center retrospective design.
- Limited sample size.
- Histopathological confirmation was unavailable in all cases.

Long-term follow-up data were not available.

CONCLUSION

MRI is an indispensable imaging modality in the evaluation of female pelvic masses. Its superior soft tissue resolution, multiplanar imaging capability, and excellent tissue characterization enable accurate determination of lesion origin, differentiation between benign and malignant lesions, and precise staging of pelvic malignancies. MRI significantly improves diagnostic confidence and contributes to optimal patient management and surgical planning.
MRI is an indispensable imaging modality in the evaluation of female pelvic masses. Its superior soft tissue resolution, multiplanar imaging capability, and excellent tissue characterization enable accurate determination of lesion origin, differentiation between benign and malignant lesions, and precise staging of pelvic malignancies. MRI significantly improves diagnostic confidence and contributes to optimal patient management and surgical planning.

Figure Legends

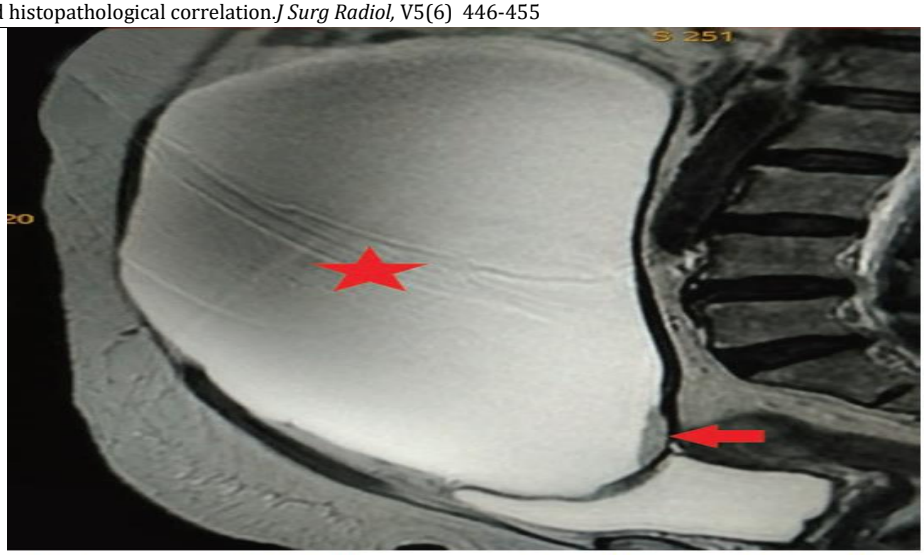

Fig. 1 Sagittal T2-W MRI demonstrating a large well-defined thin walled unilocular cystic lesion (star) arising from right ovary. Small mural nodule is visualized (arrow). Findings could represent right ovarian cystic neoplasm (possible ovarian serous cystadenoma). MRI, magnetic resonance imaging; T2-W, T2-weighted.

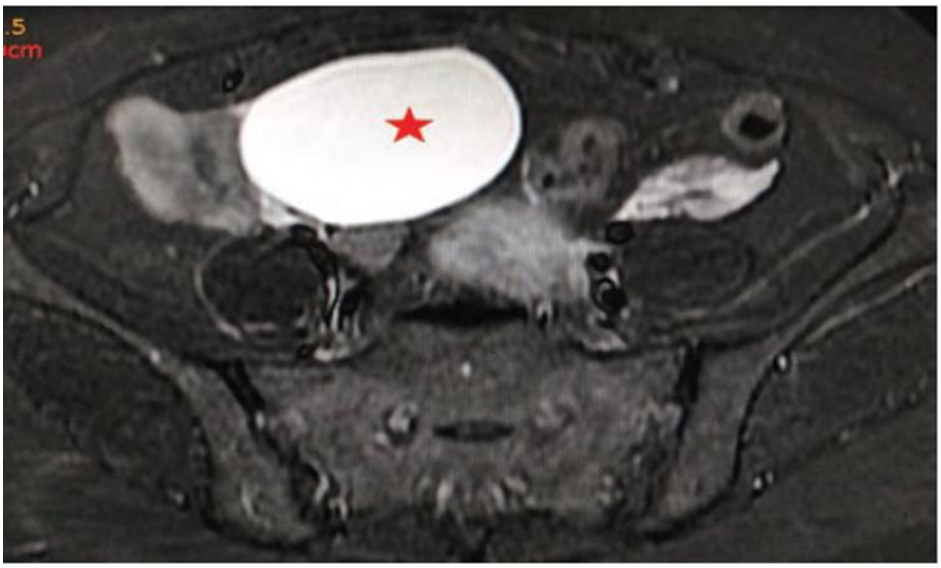

Fig. 2 Axial STIR MRI demonstrating a well-defined nonenhancing thin-walled cystic lesion (star) arising from the right adnexa, features are of concern for ovarian etiology, likely serous cystadenoma. MRI, magnetic resonance imaging.

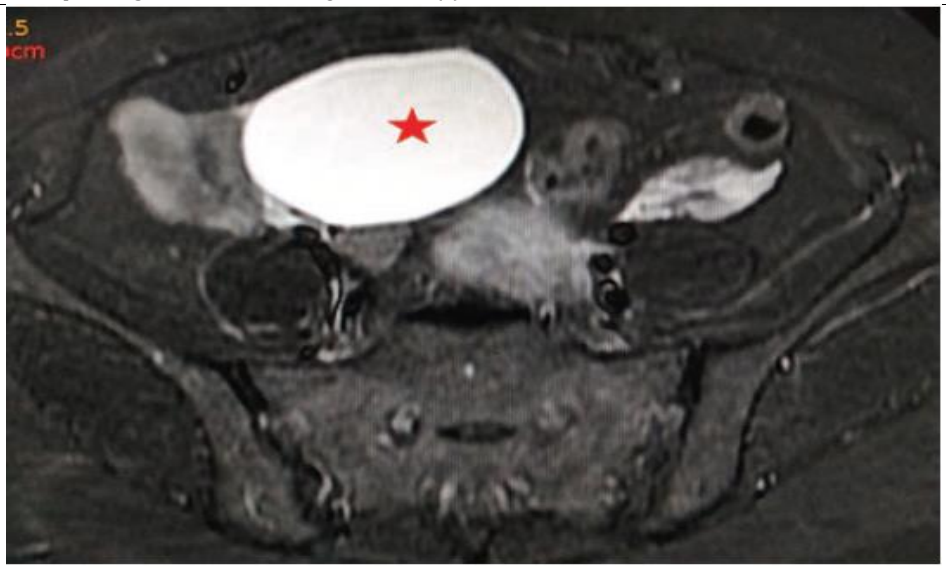

Fig. 2 Axial STIR MRI demonstrating a well-defined nonenhancing thin-walled cystic lesion (star) arising from the right adnexa, features are of concern for ovarian etiology, likely serous cystadenoma. MRI, magnetic resonance imaging.

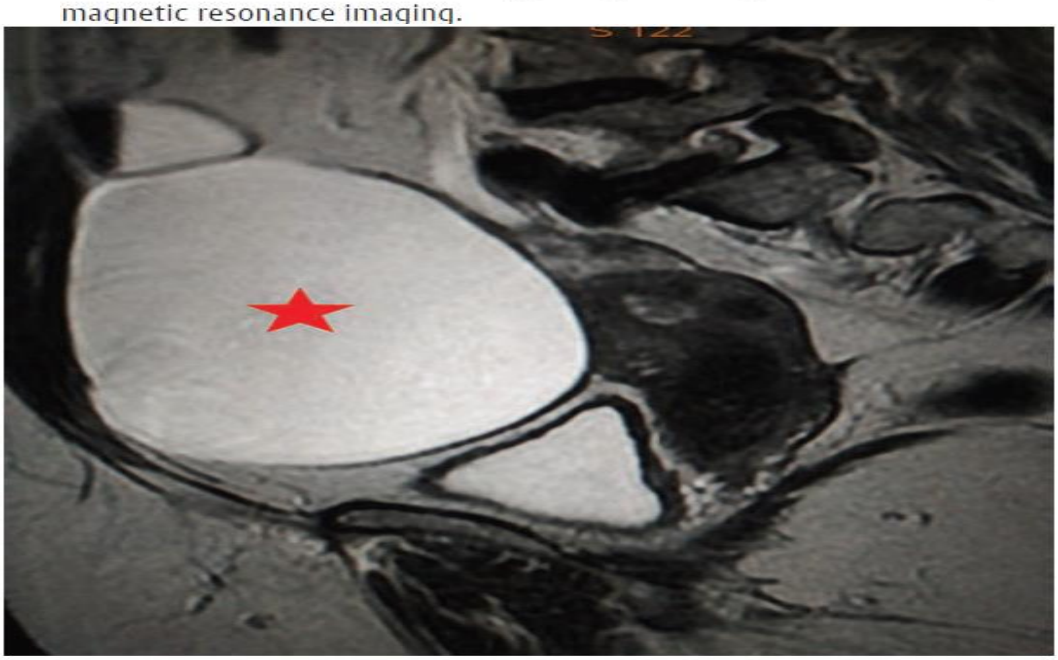

Fig. 3 Sagittal T2-W MRI demonstrating a large well-defined thin-walled cystic abdomino pelvic lesion (star) with no solid component. MRI, magnetic resonance imaging.

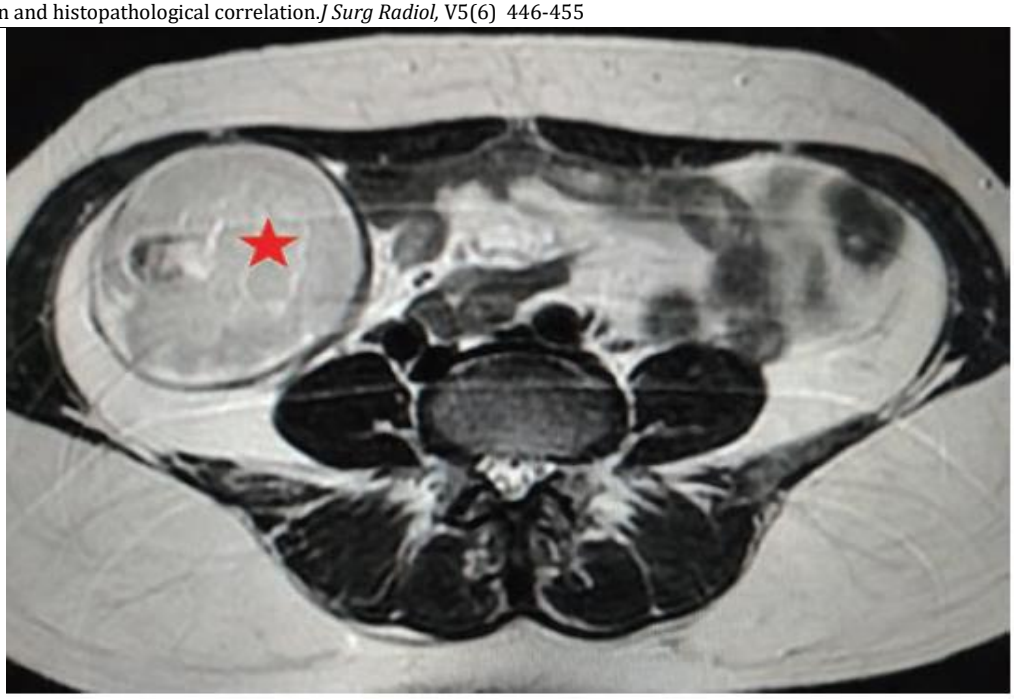

Fig. 4 Axial T2-W MRI demonstrating a well-defined mixed signal intensity lesion (star) at right adnexa with few areas of fat fluid levels, foci low signal calcification and nodule in the wall of the right mass, S/O benign cystic teratoma. MRI, magnetic resonance imaging.

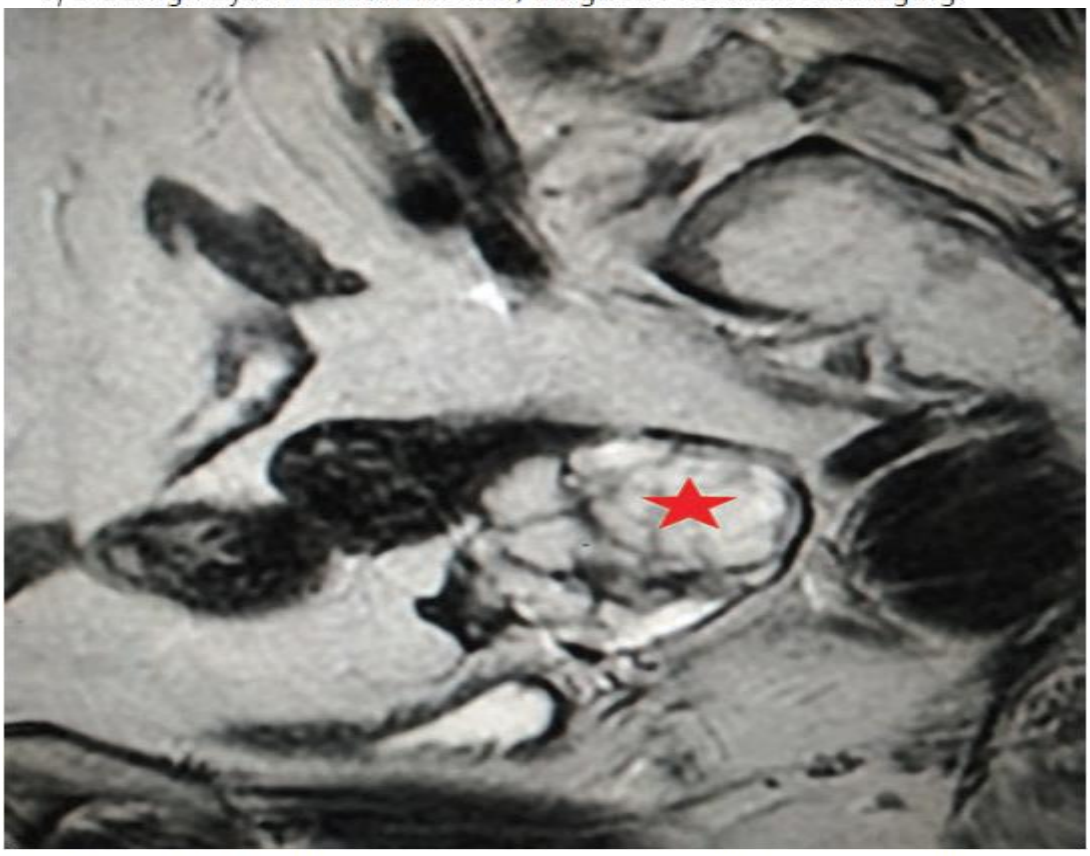

Fig. 5 Sagittal T2-W MRI demonstrating a well-defined multiloculated heterogeneously hyperintense cystic lesion (star) in the right adnexa. Right ovary is not visualized separately from the lesion, features are of concern for malignant ovarian etiology. MRI, magnetic resonance imaging.

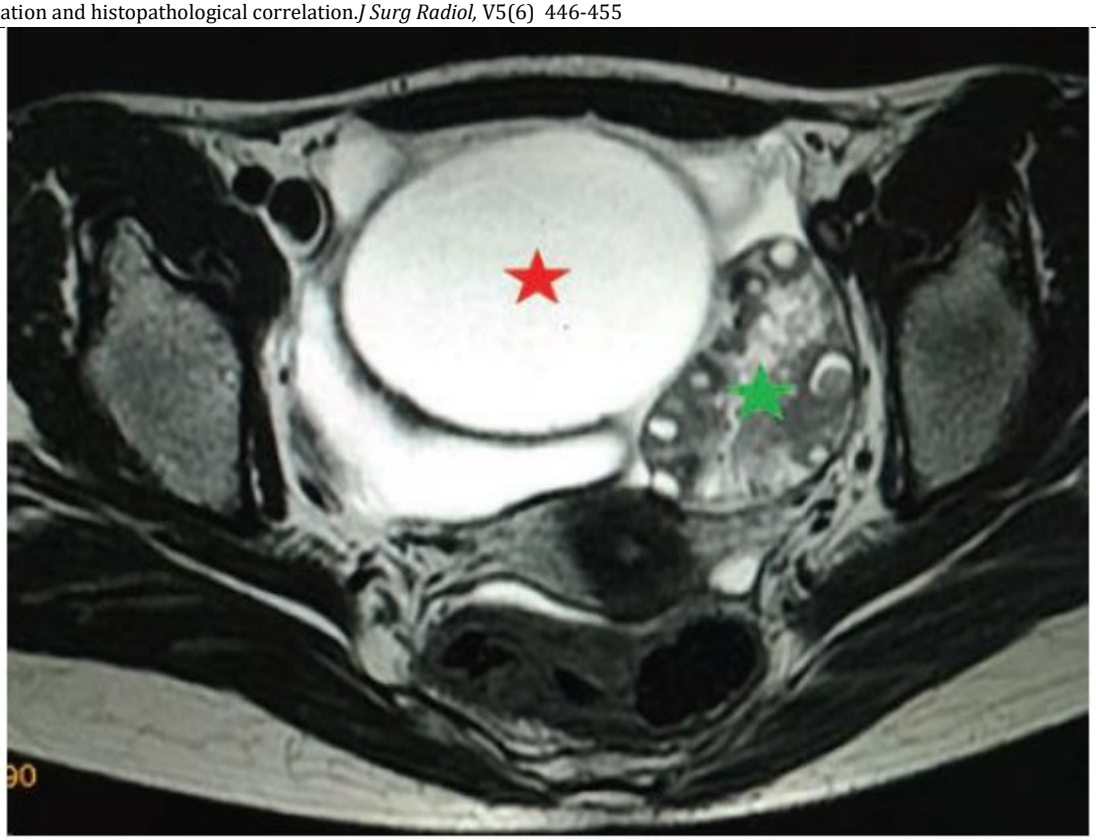

Fig. 6 Axial T2-W MRI demonstrating a well-defined hyperintense left paraovarian cystic lesion (red star) with twisted ovarian pedicle and bulky left ovary (green star), possibly torsion of left ovary. MRI, magnetic resonance imaging.

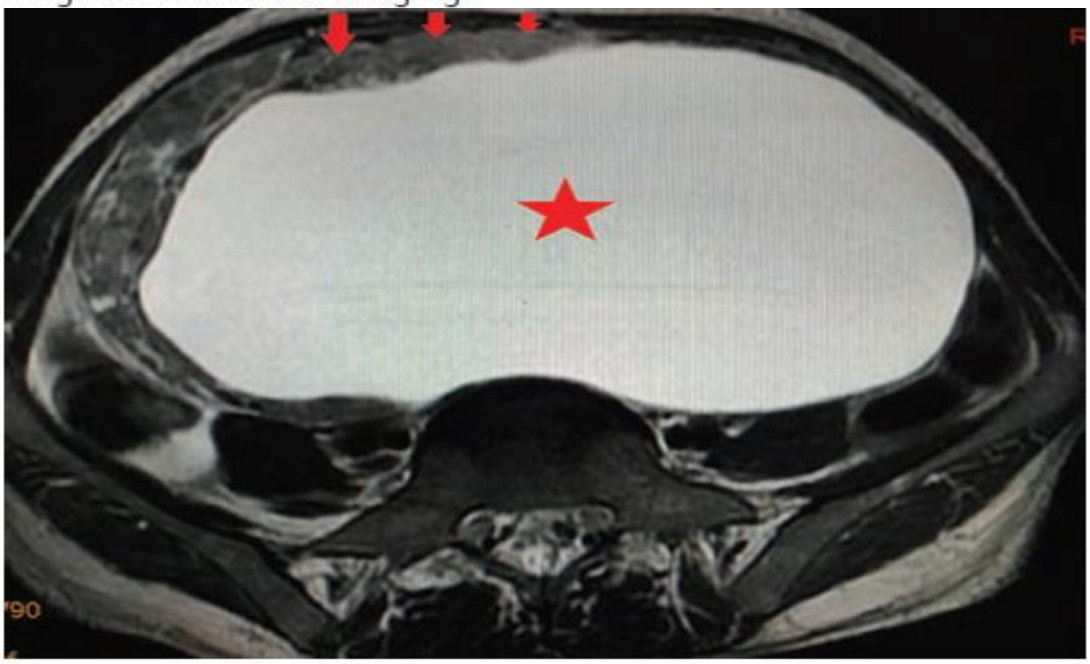

Fig. 7 Axial T2-W MRI demonstrating a well-defined hyperintense adnexal cyst (star) of ovarian origin. Mural nodule (arrows) is seen anterolaterally. MRI, magnetic resonance imaging.

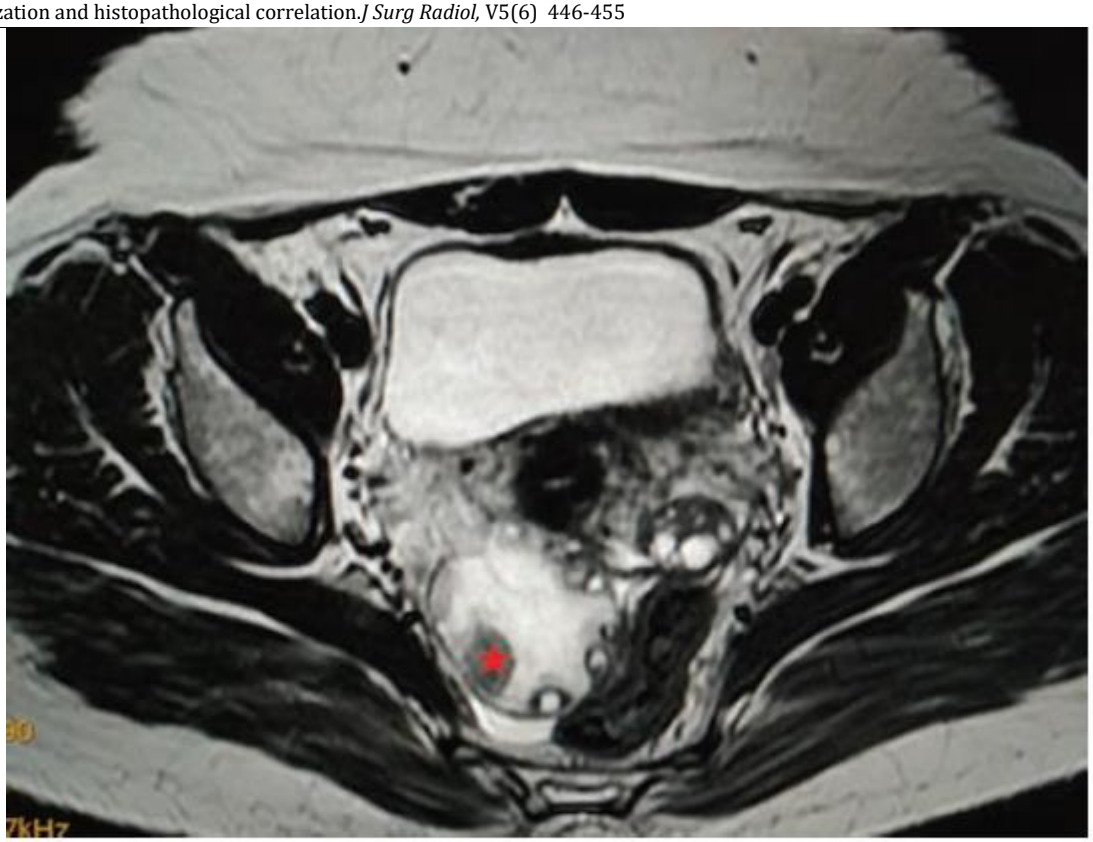

Fig. 8 Axial T2-W MRI demonstrating bulky right ovary with well-defined hypointense solid lesion (star) and twisted ovarian pedicle features are of concern for neoplastic lesion of right ovary with probable torsion. MRI, magnetic resonance imaging.

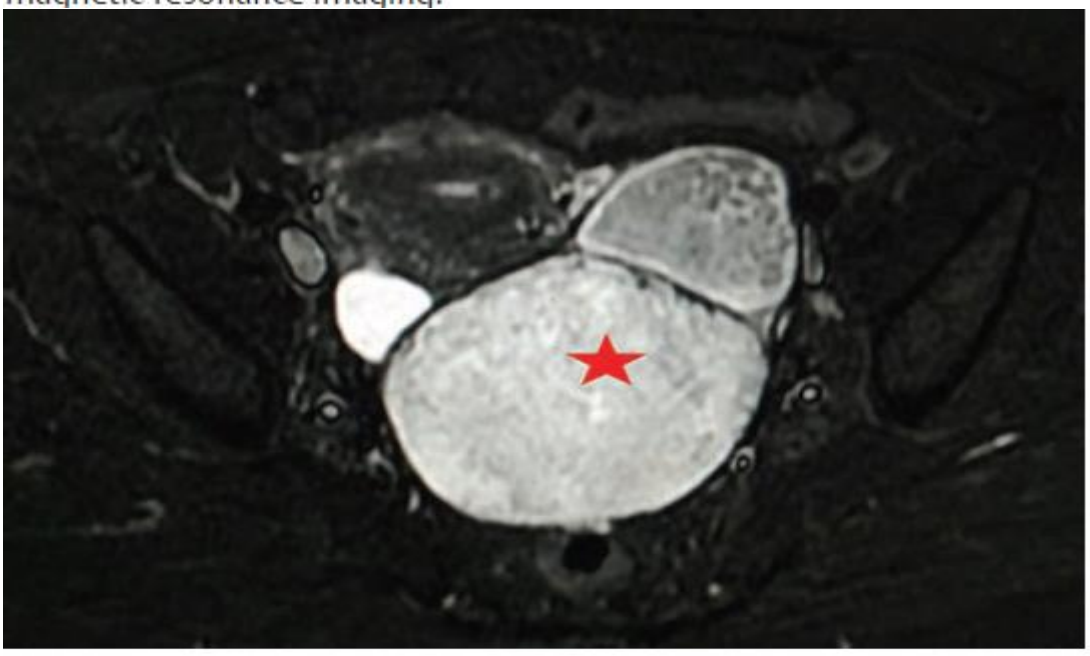

Fig. 9 Axial STIR MRI demonstrating a thin walled heterogeneously hyperintense lesion (star) in the left adnexa: findings are of concern for atypical teratoma versus malignant etiology. MRI, magnetic resonance imaging.

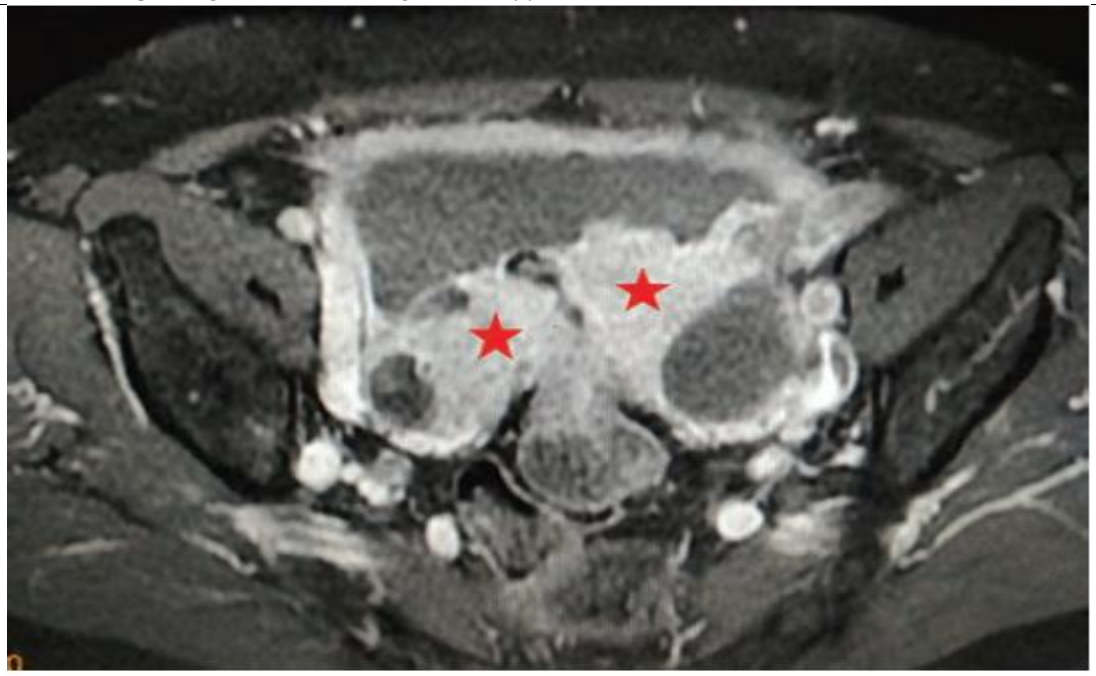

Fig. 10 Axial T1 + contrast MRI demonstrating bilateral lobulated solid cystic lesions (stars) in bilateral adnexal regions. The solid component shows heterogeneous enhancement on post contrast images. Bilateral ovaries are not visualized separately, features are of concern for malignant ovarian etiology. MRI, magnetic resonance imaging.

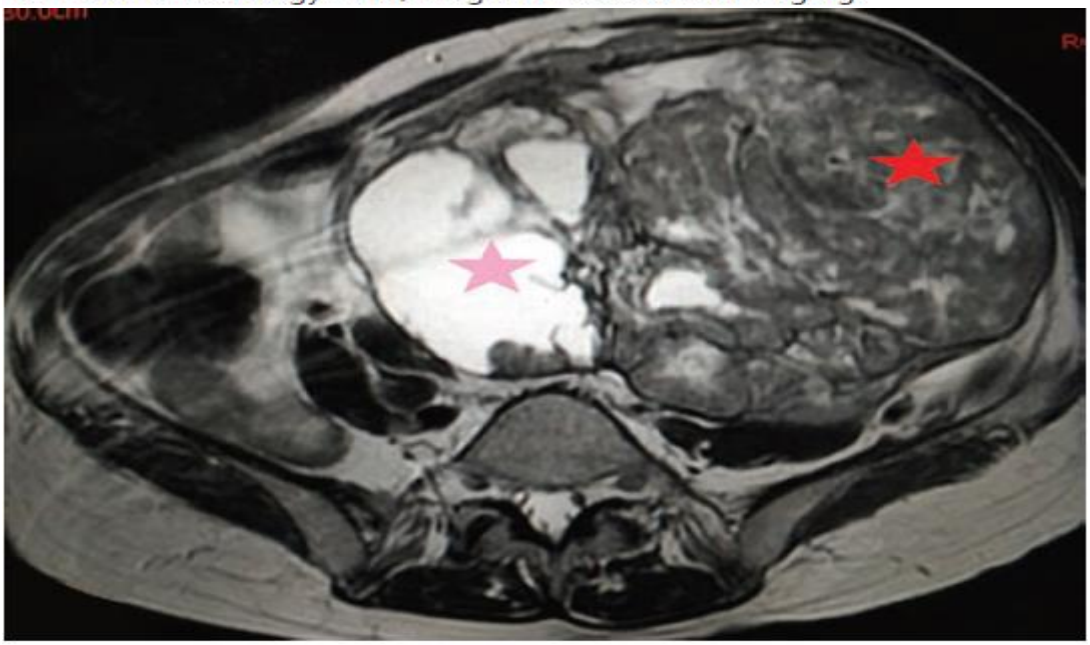

Fig. 11 Axial T2-W MRI demonstrating a large complex solid (red star) cystic (pink star) mass lesion involving pelvis and left lower abdomen. Both ovaries not separately seen, features are consistent with ovarian neoplastic etiology. MRI, magnetic resonance imaging.

REFERENCES

1. Adusumilli S, Hussain HK, Caoili EM, et al. MRI of sonographically indeterminate adnexal masses. AJR Am J Roentgenol. 2006.
2. Szklaruk J, Tamm EP, Choi H, Varavithya V. MR imaging of common and uncommon pelvic masses. Radiographics. 2003.

3. Sohaib SA, Sahdev A, Van Trappen P, Jacobs IJ, Reznek RH. Characterization of adnexal masses on MRI. AJR Am J Roentgenol. 2003.
4. Sala E, Wakely S, Senior E, Lomas D. MRI of malignant neoplasms of the uterine corpus and cervix. AJR Am J Roentgenol. 2007.
5. Smorgick N, Maymon R. Assessment of adnexal masses using ultrasound. Int J Womens Health. 2014.