

## CASE REPORT

### COMPARATIVE EVALUATION OF USG AND MRI FINDINGS IN ENDOMETRIAL MASSES: A PICTORIAL ASSAY

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**ABSTRACT:** Ultrasonography has been the gold standard in imaging of pelvis. The transvaginal sonography gives good details of lesions involving both endometrium and myometrium but still sometimes fail to give exact diagnosis. Computed tomography is of not much help in assessing endometrial-myometrial lesions. Magnetic Resonance Imaging has been now established as a prime tool to evaluate the involvement of endometrium and myometrium in lesion which are embedded in both and hence ultrasound may not be diagnostic alone, as per various studies worldwide. We selected three different patients of gynecological complaints coming to our Department of Radiology at Terna Sahyadri Speciality Hospital run by Terna Medical College in Navi Mumbai, India, and having undergone ultrasound and MRI scans and the diagnosis were confirmed by histopathology. We studied the cases and compared the ultrasound and MRI findings and concluded that indeed the MRI is an important modality to assess such lesions and helps in planning of treatment by gynecologists.

**KEYWORDS:** Endometrium, Interphase, myometrium, MRI, USG.

**INTRODUCTION:** Since ages we have been accustomed to understand that ultrasonography is the best diagnostic tool for diagnosing uterine lesions, more so by transvaginal scan apart from traditional trans abdominal scan, as these are the most readily available, economical, and both patient and doctor friendly modalities. It easily diagnoses the lesions in myometrium and endometrium of uterus. But endometrial lesions infiltrating myometrium or those lesions whose exact anatomy is doubtful because of the overlap need further investigations.

Till recently post contrast CT scan were routinely done, but could not throw much light on the matter. Recently, application of MRI scan in pelvic lesions are throwing up more information and clarity on its ability to diagnose more anatomical details and pathological – morphological pattern needed to ascertain the benignancy or malignancy of a lesion.<sup>1,2,3</sup> We tried to assess this new knowledge by comparing the ultrasonography findings with MRI scan findings of three patients of different types of lesions in our department.

**MATERIALS & METHODS:** We considered three patients of our department who had different findings of endometrial – myometrial lesions as a study of comparison of USG and MRI findings and confirmed them by histopathology study.

All these patients had undergone Trans abdominal and transvaginal ultrasonography with color Doppler study on Philips HD 14 ultrasonography machine to diagnose the lesions and later MRI scan in the department of Radiology. Two of them had undergone transvaginal sonography in our department while one of them had done it outside at two different places with similar findings and had later come for MRI to our department.

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A 1.5 Tesla MR unit of Siemens' Magnetom Symphony Maestro Class machine was used with a dedicated phased-array pelvic coil. After 3-plane scout images had been obtained, high-resolution sagittal T2-weighted fast spin-echo imaging (repetition time 5844 msec, echo time 96 msec, echo train length 8, 20 slices, slice thickness 3 mm, gap 0.3 mm, field of view 20-26 cm, matrix 384 × 256, 2 acquisitions) was performed.

Then 2 T2-weighted scans coronally and axially to the longitudinal axis of the uterine body were acquired with the same acquisition parameters.<sup>4</sup> Finally, a sagittal T1-weighted fast gradient echo (repetition time 140 msec, echo time 4.5 msec; flip angle 80°, 12 slices, thickness 5 mm, gap 0.5 mm, field of view 20-26 cm, matrix 192 × 256, 2 acquisitions) was performed before and after intravenous administration of 20 mL of gadolinium followed by flushing with 20 mL of saline. Post contrast images were acquired at 30, 60, and 120 seconds.

**CASE NO. 1:** A 30 years old female, P<sub>3</sub>L<sub>3</sub>A<sub>1</sub> had been admitted in gynecological ward with complaint of continuous bleeding per vagina since 2 months. She had past history of two spontaneous abortions in past 4 month followed by Dilatation and Curettage (D & C) done in a private hospital.

There was no history of foul smelling discharge or fever. She was pale on general examination and per vaginal / speculum examination revealed a 3 x 3 cms mass in endo cervix with bleeding on touch. Gynecologists kept a provisional diagnosis of carcinoma cervix and was sent to us for sonological confirmation.

Both trans abdominal and transvaginal ultrasonography revealed an endocervical rounded, heteroechoic, highly vascular, pedunculated lesion of size 3.9 x 3.1 cm suggestive of a degenerative fibroid [Fig. 1a, b, c]. Left ovary showed a hemorrhagic cyst of 3 x 3 cm size. The gynecologists wanted further confirmation by MRI.

Hence a contrast enhanced MR of abdomen and pelvis was done [Fig. 2 a, b, c], which revealed a bulky uterus with a well-defined rounded hetero intense lesion measuring 4x3.5x3 cm in the proximal cervix and endocervical region with a pedicle size of approximately 2 cm attached to it which enhanced minimally. Splitting of endometrium and upper endo cervical canal was noted suggestive of intraluminal position.

Endomyometrial interphase appeared normal. Distal cervix and vagina appeared normal. The lesion appeared benign and as splaying of endometrium and upper endocervical canal and normal endomyometrial interphase was present, MRI diagnosis was kept as benign lesion, most likely a pedunculated polyp with degeneration.

**CASE No. 2:** A 28 year old female patient with obstetric history of P<sub>1</sub>, L<sub>1</sub>, A<sub>1</sub> came to the OPD with chief complaints of bleeding per vagina since 4-5 days. She had undergone D & C for missed abortion 1 month back. UPT done by her at home was positive. USG was done to rule out retained products of conception after the previous missed abortion.

Ultrasound study was performed which showed a bulky uterus with an ill-defined lesion in the lower anterior uterine wall which was iso-to hypoechoic measuring 3.6 x 2.9cm with minimal color flow and Doppler activity [Fig. 3a, b, c]. It was diagnosed as submucosal / myometrial necrotizing uterine fibroid. No clear retained products of conception seen in the uterine cavity. Gynecologists still suspected RPOC and hence patient underwent D & C.

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Patient was still complaining of bleeding per vaginum and hence was advised plain and contrast MRI for further evaluation. The beta HCG titers were constantly rising. MRI was done and the findings were as follows. Uterus was mildly bulky in size with ill-defined lesion seen in body and upper cervix of uterus anteriorly measuring 4.6x3.3x3.4 cms.

Lesion was moderately enhancing on contrast study and was of mixed intensity on T1WI and dominantly hyper intense on T2WI and mixed intense on FAT\_SAT images [Fig. 4a, b, c]. Fundal endometrium measured 6mm and endocervical canal and endometrium was not seen separately from the uterine myometrium. Anterior myometrium appeared to be involved and bulky with bulging and mixed intensity in peri uterine fat planes. Urinary bladder walls appeared to be free from lesions and appeared normal. Only extrinsic indentation seen on bladder.

Bulky uterus with hetero intense lesion involving body of the uterus and upper cervix with invasion of endometrium and myometrium suggested a possibility of vesicular mole with malignant changes in view of myometrium and endometrium involvement. Endometrium in fundal region appears normal. Remote possibility of a partial mole with malignant changes was also to be considered. Fat planes in anterior aspect of per uterine region were involved with free bladder wall. Both adnexa appeared normal.

Histopathology was done which confirmed it as Choriocarcinoma. Patient was started on chemotherapy and being germ cell tumor it showed significant improvement with the size of tumor regressing and reduction in p/v bleeding. However later it again started to increase in size on ultrasonography done 1 month later and hence hysterectomy was done as last choice of treatment.

**CASE NO. 3:** A 65 year old post-menopausal female, known hypertensive on medication, non-diabetic, came with complaints of loss of appetite and weight since 2 months. No significant past history any operative history. On examination, except for high blood pressure, systemic findings were normal. On local examination she had bleeding per vaginum on touch. Trans abdominal and transvaginal ultrasonography revealed cystic hyperplasia of endometrium doubting dysplasia [Fig. 5]. CT scan was done which revealed hyperplastic endometrium with heterogenous post contrast enhancement in endometrial cavity [Fig.6]. This was reported as a possibility of malignancy.

To further evaluate the case we did MRI scan of abdomen with injection of gadolinium for post contrast scan. It revealed diffuse hyperplasia of endometrium up to 2.5 cms thickness with internal cystic areas with hyper intense signals [Fig. 7]. There was irregularity in the left lateral aspect of endo - myometrial interphase. There was a wide zone of differentiation in the endometrium- myometrium interphase on left lateral side [Fig. 8a, b, c]. This area showed patchy and ill-defined post contrast enhancement [Fig. 9a, b, c]. A diagnosis suggestive of dysplasia such as endometrial carcinoma was reported.

The patient was not convinced and hence did not take the line of advice. Patient represented 2 months later with increased symptoms and endometrial biopsy was done which revealed endometrial carcinoma. She was sent to oncology OPD for further line of management. Thus the MRI scan not only gave us confirmation of the findings which were suggestive of malignancy on USG and CT scan but also added the information of infiltration of myometrium by the endometrial carcinoma which could be seen as irregularity in the endometrium - myometrium interphase and wide zone of differentiation and patchy and ill-defined uptake of contrast media. It thus added more information than the ultrasound and CT scan findings.

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**DISCUSSION:** Each and every modality has its own pros and cons. Ultrasonography is the most readily available, cheapest and comfortable imaging modality for all the patients needed to be investigated in any imaging department.<sup>3</sup> CT Scan has advantages of giving more anatomical delineation of pelvis and abdomen and can be done in patients who need to be assessed for spread of lesion.

It is costly and has ionizing radiations involved. MRI scan is costlier than CT, is more time consuming and not much patient friendly, particularly 1.5 or 3 tesla super conducting magnets. However, when heterogenous lesion involving particularly endometrium is concerned, CT scan may be done to assess vascularity and anatomical delineations.<sup>5</sup> But it still cannot pick up the subtle changes of involvement of endometrium – myometrium interphase. MRI scan gives more anatomical delineations and more knowledge of vascularity of a lesion.<sup>2,3,5</sup>

For example, in the first case of the benign pedunculated fibroid, the splaying of the endometrium in cervical canal seen on MRI scan suggested noninvolvement of endometrium and ruled out malignancy. Similarly the involvement of myometrium was also ruled out.<sup>1,2</sup> In the first case where ultrasonography had picked up a pedunculated fibroid, it was re confirmed as the same diagnosis on MRI scan.<sup>7</sup>

In the second case where on first sonography the lesion was reported as a sub mucosal - myometrium degenerating necrotizing fibroid, the MRI gave a more convincing details of myometrium and endometrial involvement, rather showing that there was complete infiltration of myometrium on one side and fat planes in anterior aspect of peri uterine region were involved with free bladder wall. The vascularity of the lesion was also confirmed and hence a probability of a malignant trophoblastic tumor was kept in view of rising titers of serum beta HCG.<sup>7</sup>

In the third case as the sonography revealed cystic hyperplasia of endometrium in a post-menopausal old female, and CT scan also revealed a heterogeneous enhancement of endometrium, MRI was done to rule out malignancy as patient had on examination bleeding per vaginum. MRI showed wide zone of differentiation at endo-myometrial interphase along with irregularity of this interphase which went in favor of malignancy. These findings were not present in CT scan. Thus CT scan was of not much help.

Thus in toto, in pelvic cases of endometrial lesions, it is concluded that after ultrasonography, MRI scan is best suited to get information of involvement of endometrium and or/ or myometrium, particularly when malignant invasions are suspected. CT scan does not merit any use for such cases.

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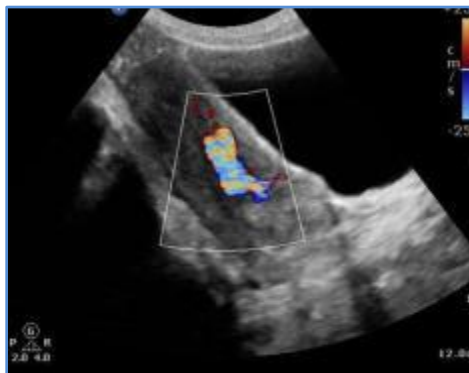
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**Fig. 1: 1a – Fibroid on TAS scan**

A mixed echogenic lesion involving anterior myometrium extending to endocervical canal with loss of endomyometrial differentiation.

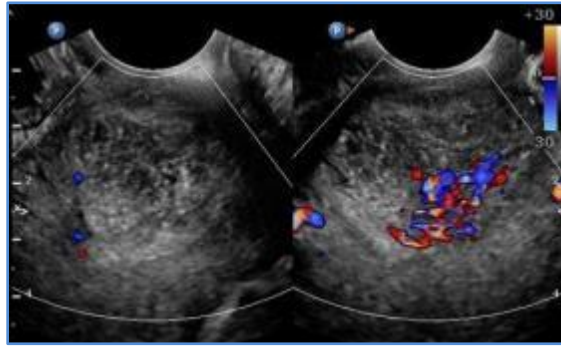


**Fig. 1: 1b – Vascular Peduncle of fibroid**

Doppler reveals linear vascular area approaching to the mixed echogenic lesion may represent vascular peduncle.

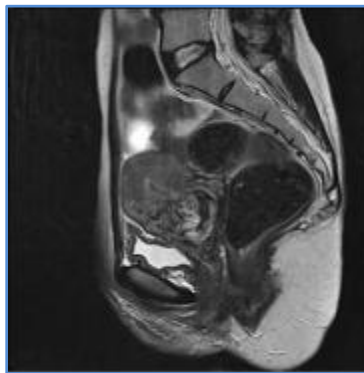
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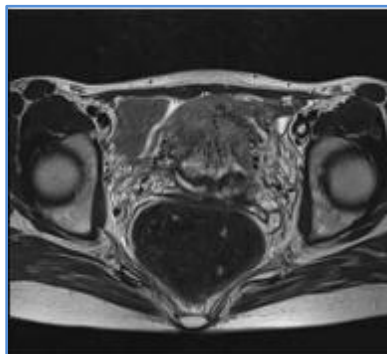
**Fig. 1: 1c – Vascularity of fibroid on color flow**

Doppler study of the lesion shows arterial as well as venous flow within the lesion distributed in patchy areas. The flow has peak systolic velocity less than 10cms/sec.



**Fig. 2: 2a – MRI scan sagittal**

Plain MRI reveals mixed intense lesion involving the posterior myometrium, endocervical canal in its proximal part with loss of interphase in between myometrium and endocervical canal. Anterior myometrium also appear to be eroded.

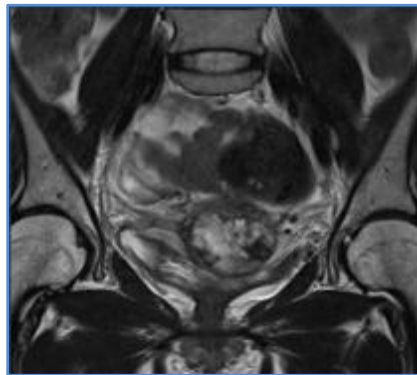


**Fig. 2: 2b – MRI scan axial view**

Erosion of the endocervical canal with hazy margins of the lesion.

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**Fig. 2: 2c – MRI scan Coronal view**

Hyperintense lesion with patchy hypointensities in posterior myometrium extending to endocervical canal and anterior myometrium.



**Fig. 3: 3a – USG endo-myometrial**

Mixed echogenic lesion with involvement of proximal endocervical canal. The lesion shows patchy linear hypoechoic areas within.



**Fig. 3: 3b – USG – endomyometrial lesion**

Doppler activity of the anterior myometrial lesion showing ring of fire like appearance.

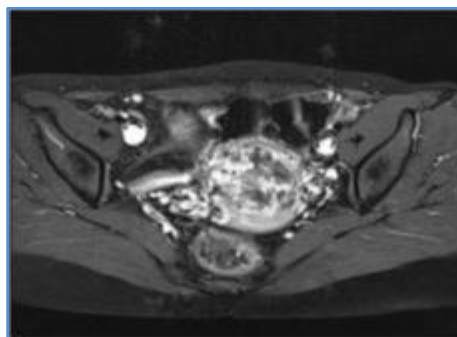
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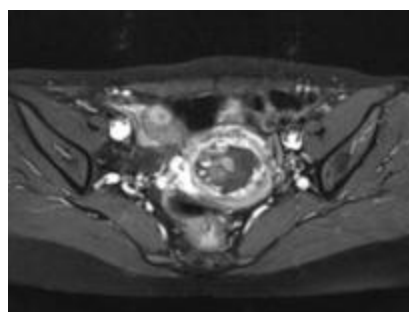
**Fig. 3: 3c - USG - USG vascularity of endomyometrial lesion vascularity**

No obvious vascularity on Doppler study with cystic areas within.



**Fig. 4: 4a - MRI of endomyometrial lesion showing heterointensity**

Post contrast T1 weighted axial image showing heterogenous contrast enhancement with patchy areas of hypointensity within. Margins of the lesion are irregular with gross thinning of the adjacent myometrium and distortion of the adjacent fat planes.

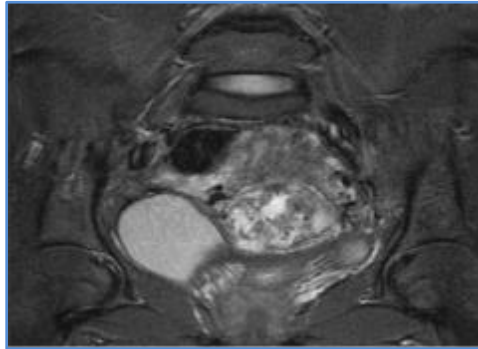


**Fig. 4: 4b - MRI of endomyometrial lesion showing central necrosis**

Post contrast T1 weighted axial image showing large areas of hypointensity devoid of contrast uptake with adjacent thinning of myometrium.



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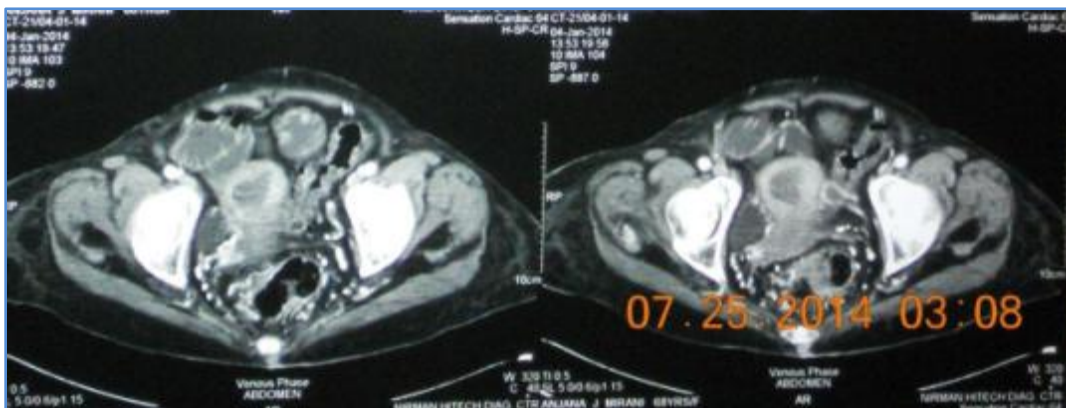


**Fig. 4: 4c - MRI coronal scan of same lesion**

Post contrast T1 weighted coronal image shows heterogenous contrast enhancement of the lesion with marginal irregularity, dominantly on anterior aspect with involvement of adjacent fat planes and perivesical fat.



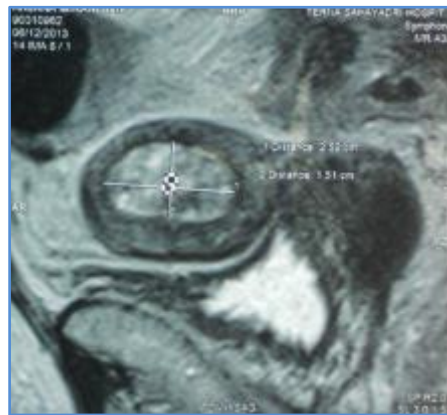
**Fig. 5: USG of endometrial cystic hyperplasia**



**Fig. 6: CT scan post contrast of Endometrial hyperplasia**

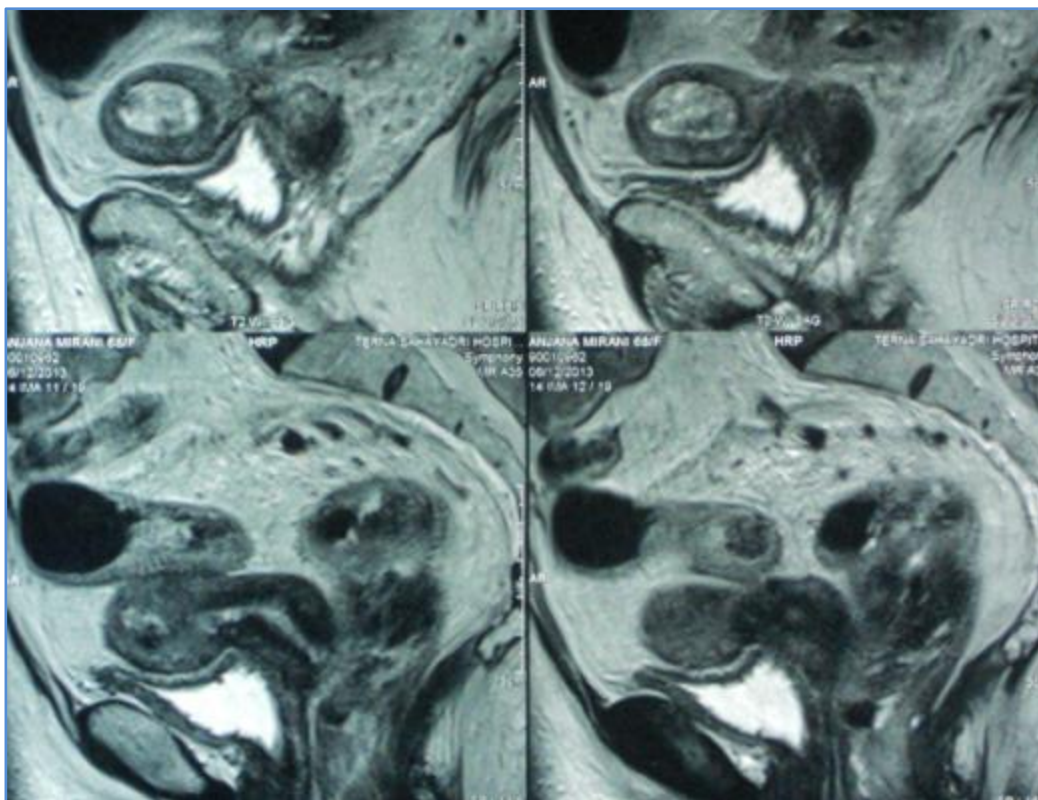
Contrast enhanced axial CT image reveals diffuse and gross endometrial thickening with patchy areas of enhancement in the endometrium.

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**Fig. 7: MRI of endometrial hyperplasia lesion -Saggital view**

Sagittal image show diffuse endometrial thickening with patchy hyper intensities within the hypertrophied endometrium.

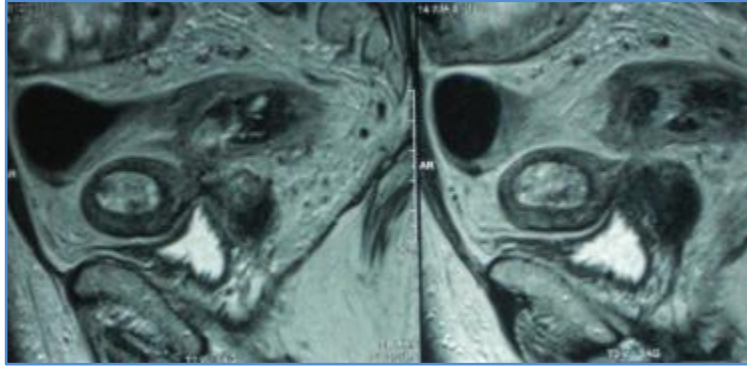


**Fig. 8: 8a - MRI Sag view showing interphase involvement of this lesion**

Hypertrophied endometrium with irregularity and loss of endo myometrial interphase on posterior aspect.

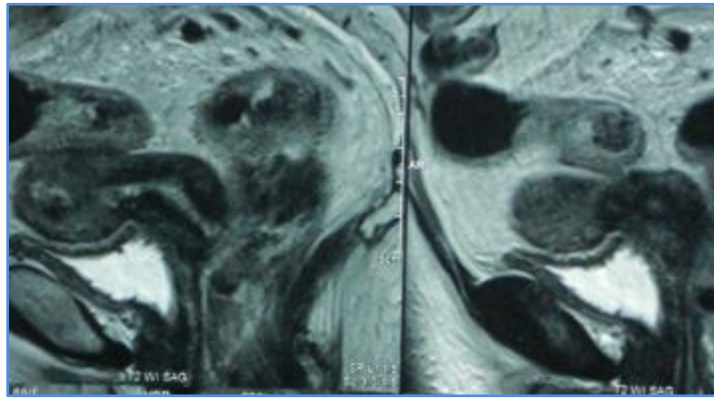
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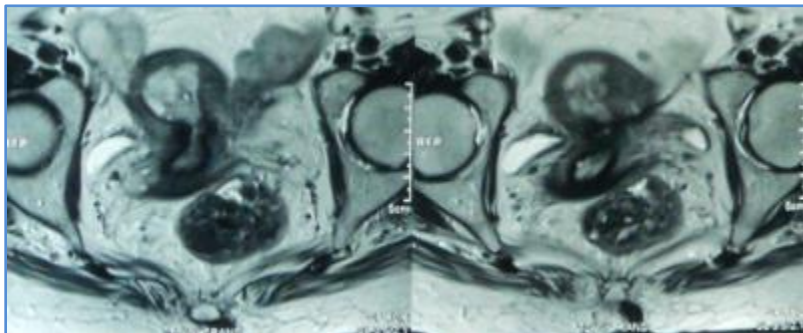
**Fig. 8: 8b- MRI of lesion showing interphase involvement**

Serial sagittal sections in paramedian direction reveals hypertrophied endometrium with irregularity and loss of endo myometrial interphase on posterior aspect.



**Fig. 8: 8c- MRI Sag view showing myometrial involvement in this lesion**

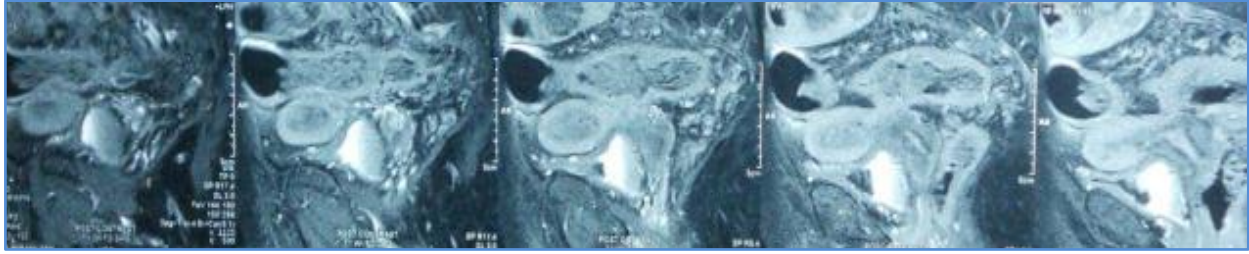
Irregularity and loss of endo myometrial interphase along posterior aspect with fairly maintained endocervical canal and normal inter phase at distal level.



**Fig. 9: 9a – MRI axial scan T2WI**

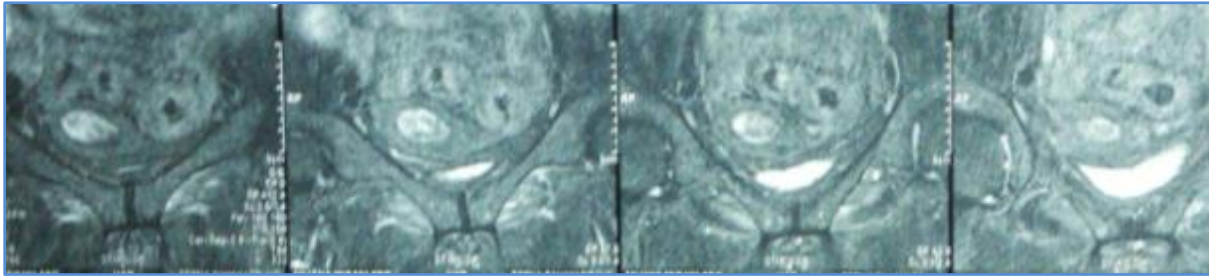
Coronal image showing loss of endomyometrial interphase and irregularity along left lateral and posterior aspect.

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**Fig. 9: 9b – MRI post contrast T1W1 scan**

Post contrast saggital images reveal patchy contrast enhancement with irregular margins and lost interphase on posterolateral aspect.



**Fig. 9: 9c – MRI STIR images coronal views**

Serial post contrast coronal images reveal heterogenous and patchy contrast enhancement with blurred margins and fairly preserved perivesical and uterine fat planes.

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