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MR Imaging diversities of degenerated uterine leiomyomas

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Abstract
Objectives: To review the imaging features of degenerated uterine leiomyomas on Magnetic Resonance Imaging.
Materials and methods: The study included 11 patients referred from the Department of Obstetrics & Gynecology, KVG Medical College Hospital, Sullia, and Karnataka. Informed consent was obtained from all the patients. The patients were subjected to MRI abdomen and pelvis based on the history and the clinical examination using Philips Multiva 1.5T.
Results: All the degenerated uterine leiomyomas demonstrated signal intensity on MRI depending upon the spectrum of degeneration within the leiomyomas which are of the following types – Hyaline, Calcific, Myxoid, Cystic and lipoleiomyoma.
Conclusion: Uterine leiomyomas are the most common tumors affecting the female pelvis which are associated with significant morbidity. They may be encountered incidentally and have typical appearances on MR imaging making the diagnosis easy. However, it is important to be familiar with varied MR imaging appearances of degenerated uterine leiomyomas to distinguish from other mimickers/ significant diseases for aiding in prompt diagnosis and management.

Keywords: MR imaging, uterine leiomyomas

Introduction
Leiomyoma's are the most common uterine neoplasm and are composed of smooth muscle with varying amounts of fibrous connective tissue [1]. Degeneration occurs when these enlarge in size outgrowing their blood supply resulting in: hyaline or myxoid degeneration, calcification, cystic degeneration, and red degeneration.
According to their location, leiomyoma's are classified as submucosal, intramural, or subserosal [2]. 20%–50% of women with leiomyoma's present with symptoms such as menorrhagia, dysmenorrhea, pressure, urinary frequency, pelvic and back pain, dyspareunia, constipation, or obstipation[3]. These benign tumors are hormone dependent, responding to both estrogen and progesterone [4], they often increase in size during pregnancy and usually decrease in size after menopause.
Ultrasonography (US) is still the preferred initial diagnostic test for patients with symptomatic leiomyoma's. However, magnetic resonance (MR) imaging is the most accurate imaging modality for detection and localization of leiomyoma's and their mimics: adenomyosis, solid adnexal masses, focal myometrial contractions, and occasionally uterine leiomyosarcomas [5].
Leiomyoma's typically demonstrate distinct low signal intensity relative to that of the myometrium on T2-weighted images and intermediate signal intensity on T1-weighted images. These characteristic signal intensities are attributed to extensive hyalinization, which occurs in more than 60% of uterine leiomyoma's [6]. Cellular leiomyoma's can have relatively higher signal intensity on T2-weighted images and demonstrate enhancement on contrast material–enhanced images [7].
Leiomyoma's with hyaline or calcific degeneration have low signal intensity on T2-weighted images, an appearance similar to that of standard leiomyoma's. Cystic degeneration show high signal intensity on T2-weighted image without contrast enhancement. Myxoid degeneration show very high signal intensity on T2-weighted images and enhance minimally on contrast-enhanced images [1]. The differential diagnosis of leiomyoma's includes adenomyosis, solid adnexal mass, focal myometrial contraction, and uterine leiomyosarcomas.
Hysterectomy and myomectomy are the traditional surgical treatments for symptomatic leiomyoma's. Uterine fibroid embolization (UFE) has been a popular and effective minimally invasive treatment for symptomatic fibroids[5]. This procedure offers the advantages of avoidance of surgical risks, potential preservation of fertility, and shorter hospitalization [8].

Objectives
To review the imaging features of degenerated uterine leiomyoma's on Magnetic Resonance Imaging.

Materials and Methods
This was a cross sectional study on 11 patients which was done between January 2017 and January 2018. The patients were referred from the Department of Obstetrics and Gynecology for the evaluation of mass per abdomen, menorrhagia and abdominal pain.

Patients with previous history of claustrophobia and previous contrast reactions were excluded from this study. The age of the patients ranged between. The patients were subjected to MRI using Philips Multiva 1.5 T after a initial screening procedure. Axial, sagittal & coronal T1, T2 and SPAIR sequences were taken. Post Gadolinium axial, sagittal & coronal fat saturated T1 sequences were obtained.

Results

Degenerated leiomyoma's demonstrated signal intensities on various sequences depending on the type of degeneration and internal contents within as discussed below.

Discussion

Hyaline Degeneration

It is the most common form of degeneration that can occur in a uterine leiomyoma. It is thought to occur in up to 60% of uterine leiomyoma's. Leiomyoma's with hyaline degeneration have low signal intensity on T2-weighted images, an appearance similar to that of standard leiomyoma's.

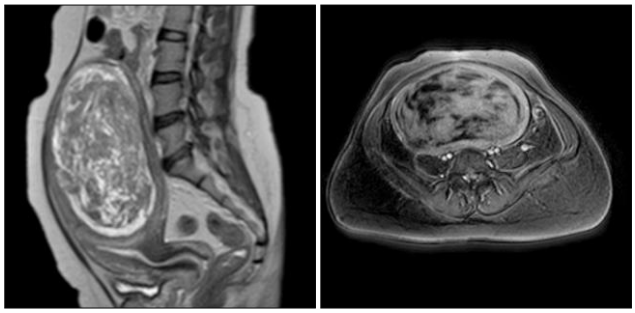

Fig 1: Sagittal T2 and axial post contrast T1 weighted images demonstrating hyaline degeneration of fibroid in a 36 year old patient with minimal enhancement.

Cystic Degeneration

Cystic degeneration may be considered an extreme sequel of edema and is observed in about 4% of leiomyoma's. The cystic spaces appear as round, well-demarcated areas with the signal intensity characteristic of fluid: low on T1-weighted images and high on T2-weighted images with no enhancement.

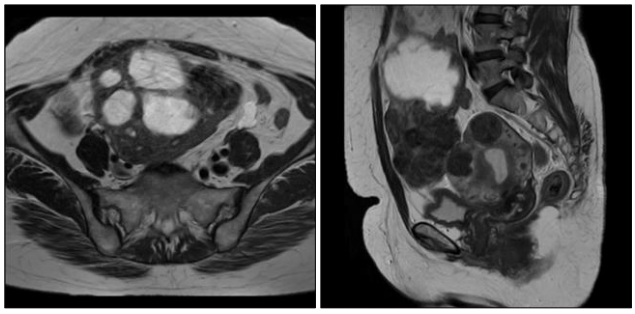

Fig 2: Axial and sagittal T2 Weighted MRI images showing pedunculated mixed solid and cystic mass lesion in the pelvis arising from the fundus of uterus in a 47 year old female patient with multiple intramural and subserosal uterine leiomyoma's.

In an another 20 year old unmarried patient, a large midline pelvic mass was noted mimicking a complex adnexal cyst of ovarian origin.

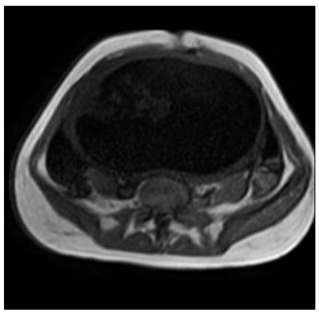

Fig 3: Axial T1 weighted image in a 20 year old patient with complains of mass per abdomen and menorrhagia demonstrates midline cystic mass lesion in the pelvis with continuity of the wall along the myometrium.

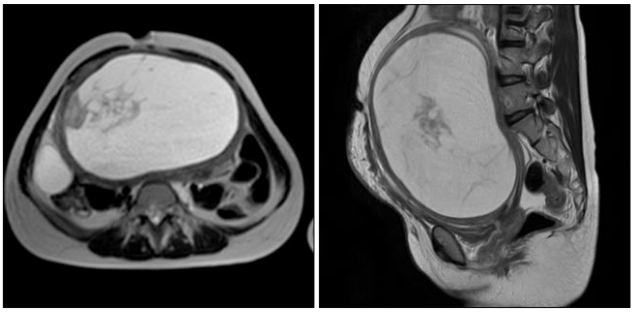

Fig 4: Axial and Sagittal T2 weighted images of the same patient shows a homogeneous increased signal intensity lesion with few internal septations and mural nodule along its right lateral aspect. Right ovarian cyst and left ovary (not shown here) were visualized separately. The endometrium is seen displaced posteriorly by this lesion.

Lipoleiomyoma

These are uncommon benign neoplasms of uterus and are considered to be a variant of uterine myomas. Their reported incidence varies from 0.03 to 0.2%. These tumors generally occur in asymptomatic obese perimenopausal or menopausal women.

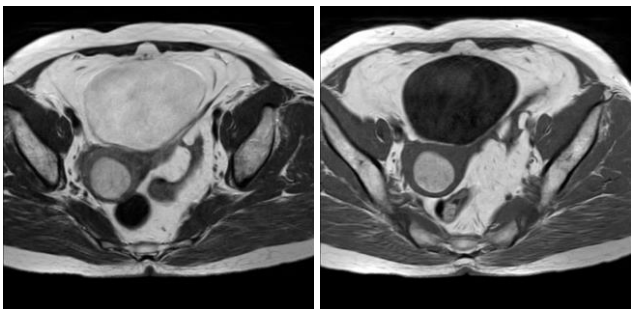

Fig 5: Axial T2 and T1 weighted images shows a well-defined increased signal intensity lesion in the intramural location on both sequences.

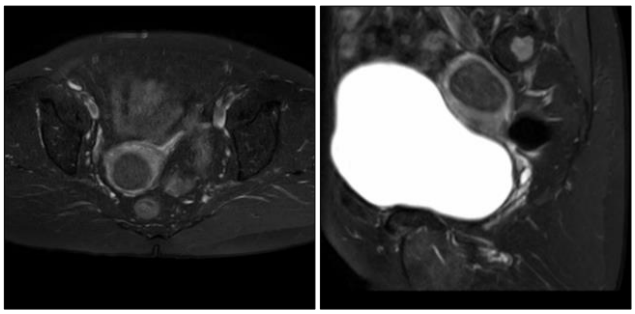

Fig 6: The lesion demonstrated suppression on fat suppression axial and sagittal sequences.

Myxoid Degeneration

Myxoid leiomyoma contains a significant myxoid material between the smooth muscle cells.

The lesions are soft and translucent but solid. This myxoid component is heterogonous, high intensity on MRI T2 weighted images.

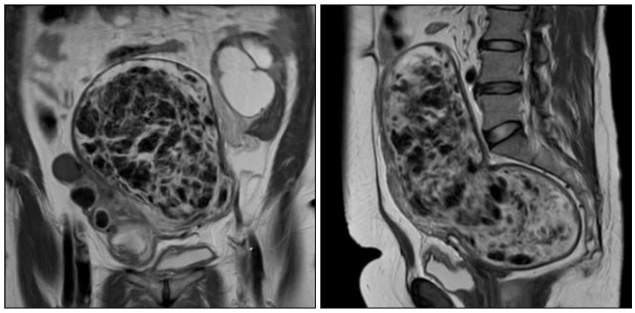

Fig 7: Coronal and Sagittal T2 weighted images show a vertically oblong lobulated hetero intense subserosal mass lesion arising from the posterior wall of the uterus and cervix. Complex left ovarian cystic neoplasm is seen in the coronal images.

Calcific Degeneration

Secondary calcification occurs in hyalinized tissue in about 4% of leiomyoma's. The calcification is usually dense and amorphous. This pattern of calcification at plain radiography almost exclusively indicates the diagnosis of leiomyoma.

On MRI, Lack of signal within masses that does not change with different TR & TE parameters is highly suggestive of calcification.

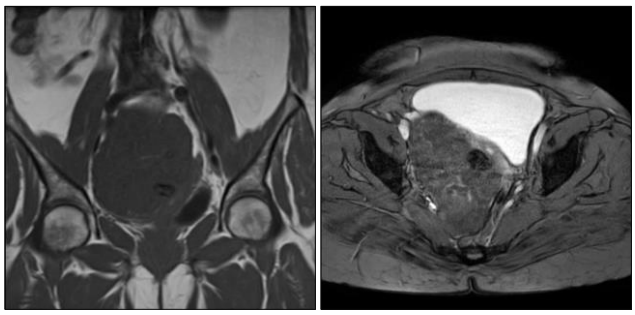

Fig 8: Hypo intense lesion within iso intense uterine fibroid on Coronal T1 and axial gradient sequences is seen suggestive of calcific focus in a hyaline degenerated leiomyoma's.

Conclusion

MR imaging allows detection, localization, and characterization of uterine leiomyoma's and exclusion of other causes of uterine and adnexal masses in the female pelvis. They can be detected as an incidental finding while undergoing imaging for other reasons or in symptomatic patients. Degenerated uterine fibroids have diverse imaging findings on MRI, the knowledge of which helps in prompt diagnosis and treatment.

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