

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



یادواره دکتر کاظمی آشتیانی

وینار میوم و ناباروری

راههای تشخیص میوم در پاراکلینک

دکتر فیروزه احمدی

متخصص رادیولوژی

دانشیار، عضو هیئت علمی پژوهشگاه رویان

Imaging in leiomyoma

Dr. Firoozeh Ahmadi

Assistant Professor of Radiology

Department of Reproductive Imaging, Royan Institute, Tehran, Iran

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Introduction

The myometrium is the muscular tissue of the uterus and the cervix, which encloses the uterine cavity and its lining, the endometrium. The myometrium is generally isoechoic (similar to the liver) and homogeneous. The myometrial echogenicity, thickness, contour and presence of any mass or cysts are noted during ultrasound examination. The two commonly encountered pathologies of the myometrium are fibroids and adenomyosis.

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Introduction

Fibroids, also known as leiomyomas, are benign tumours of the myometrium. They are composed of smooth muscle cells and connective tissue in densely packed whorls. They are common, and about 40% of women by the age of 40 years have fibroids. Very often they are multiple.

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The procedures indicated in the work-up of uterine fibroids include:

- Ultrasound examination,(2D/3D,doppler)
- Saline-infusion sonography,
- Magnetic Resonance Imaging (MRI)
- Hystrosalpingography

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- Imaging techniques are crucial for the planning of medical or surgical treatment

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□ The goals of imaging include:

localization, number, measurement, characterization of fibroids, relation with endometrial cavity and uterine layers, vascularization and differential diagnosis from other myometrial pathology, such as adenomyosis, smooth tumors of unknown malignant potential (STUMP) and leiomyosarcomas.

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□ Ultrasound is an easy, accessible, harmless and inexpensive diagnostic procedure; it can indeed be considered the first tool in the assessment of uterine myometrial pathology. Both transabdominal and transvaginal/transrectal (endocavitary) approach may be used, depending on the field of view desired.

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- ❑ Transabdominal imaging offers a wide field of view, increased depth of signal penetration, flexibility in transducer movement, and the ability to examine other organs. Transabdominal ultrasound is more effective than endocavitary ultrasound for the visualization of subserosal or perisitic myomas extending into the abdominal cavity. It is also more effective when very large tumors are present.

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- ❑ Endocavitary ultrasound provides detailed images of the myoma because the probe is positioned close to the tumor, which means that high-frequency ultrasound can be used.
- ❑ Endocavitary ultrasound is reliable and a high level of interobserver agreement has been recorded for measurement of uterine size and endometrial thickness.

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□ The combination of transabdominal ultrasound and endocavitary ultrasound is the most widely used technique for the detection, mapping and characterization of myomas.

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□ The uterus is first evaluated in the sagittal and transverse sections on 2D. 3D is used to get a coronal section of the uterus, which provides good information of the external uterine contour, cavity shape, endomyometrial junction and relation of myometrial pathology to the endometrial mucosa and serosa. Dopplers are used as and when relevant, typically when pathology is noted.

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- ❑ Fibroids typically appear as round, well-defined, oval or lobulated solid masses seen in the uterus or arising from it.
- ❑ Fibroids show variable echogenicity depending upon the proportion of muscle cells and fibrous stroma and the presence of any degenerative changes. They can appear from hypoechoic to hyperechoic.
- ❑ Calcification is seen as echogenic foci with shadowing
- ❑ Cystic areas of necrosis or degeneration may be seen
- ❑ Fibroids generally show linear stripy fan-shaped internal acoustic shadowing and also shadowing from its edges (reported as 'edge shadows').

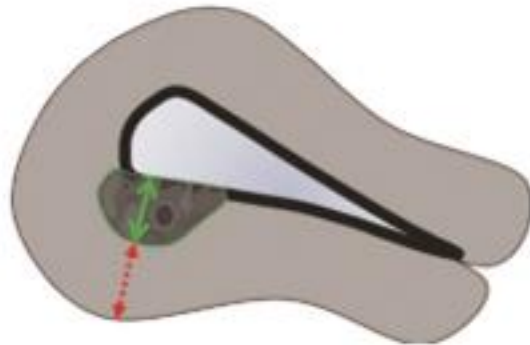
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Penetration of ill-defined lesions (From Van den Bosch et al. [2])

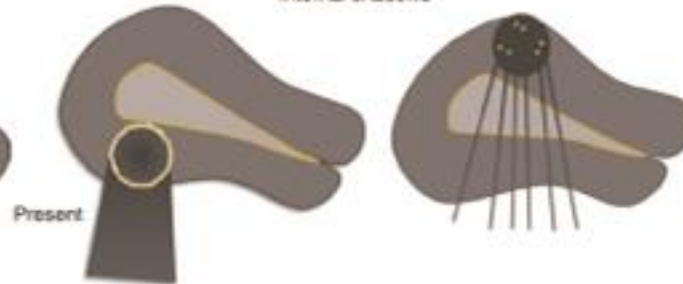


Ultrasound image of a calcified fibroid causing intense internal shadows

Edge shadows



Internal shadows



Shadowing caused by fibroids (From Van den Bosch et al. [2])

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- ❑ On Doppler, fibroids typically show pericapsular flow (i.e. circumferential flow around its margins). Some amount of intralesional flow is also commonly seen within the fibroid. Some fibroids may, however, show high vascularity (increased vascularity seems to be related to increased cellularity in fibroids).

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Basics of Fibroid Mapping

To map or describe the location of any mass like a fibroid, in the uterus, one must know four parameters:

- How superior or inferior the mass is. For this, the uterus can be divided into fundus, upper corpus, midcorpus, lower corpus and cervix.
- How anterior or posterior the mass is. The mass could be in the anterior wall or the posterior wall.
- How much to the left or right the mass is. The mass could be right sided, left sided or in the midline.
- How close is the mass to the inner endometrial mucosa or the outer serosa?

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Locating the fibroid or 'fibroid mapping' is very important because:

- ❑ It gives us information about whether the fibroid is the cause for the patient's symptoms. For example, fibroids that are submucous are more likely to cause menorrhagia; fibroid polyps are more likely to cause metrorrhagia and dysmenorrhoea.
- ❑ It also helps to decide if surgery is required and, if so, the type of surgery that is appropriate - a hysterectomy, myo- mectomy or a hysteroscopic resection.
- ❑ A good mapping also helps the surgeon during surgery to know the exact site of the various fibroids for a proper surgical approach and to ensure that all the fibroids are managed optimally.

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❑ Broad ligament fibroids originate from hormonally sensitive smooth muscle elements and extend laterally from the uterus, and are often confused with adnexal masses. In some cases they can detach from the uterus and become mobile within the peritoneal cavity

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□ The differential diagnosis for this type of fibroids includes masses of ovarian origin (both primary neoplasms and metastases), broad ligament cysts, and lymphadenopathy. Ultrasound may be of great help in diagnosing broad ligament leiomyomas because it permits clear visual separation of the uterus and ovaries from the mass and mapping of the vascular supply of the tumor.

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- ❑ The European Society of Hysteroscopy classifies submucosal myomas as follows:
- ❑ Type 0: fibroid polyp (the mass is located entirely within the uterine cavity);
- ❑ Type I: >50% contained within the uterine cavity or <50% contained within the myometrium;
- ❑ Type II: <50% contained within the uterine cavity or >50% contained within the myometrium (13).
- ❑ Type III of submucosal myomas was added by Donnez et al. and correspond to multiple (>2) submucosal fibroids (myofibromatous uterus with submucosal fibroids and intramural fibroids)

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- ❑ In case of submucosal fibroids minimal free myometrial margin, i.e. the distance between the outer margin of the fibroid and the uterus surface, has to be measured .
- ❑ This is an important parameter to decide if a hysteroscopic removal can be performed; in fact some studies documented the possibility to remove also submucosal myoma with minimal free margin <5 mm, but the recommended margin is ranged between 5 and 10 mm.

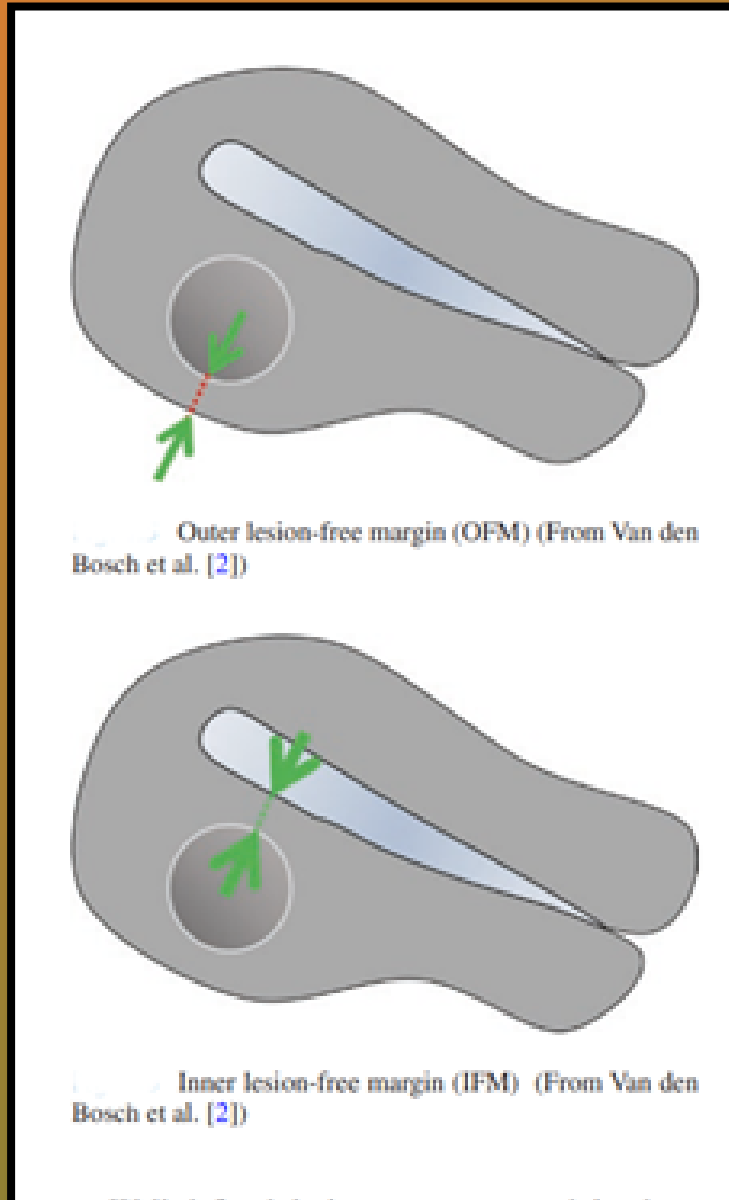
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❑ Cervical fibroids may grow supravaginally or intravaginally; they are very close to the uterine artery and ureter. Sometimes they can be confused with other cervical pathology such as cervical carcinoma .In these cases, transvaginal ultrasound enables the performance of a guided biopsy of the lesion avoiding invasive surgery.

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Intramural

5

Subserosal and $\geq 50\%$ Intramural

4

100% Intramural

Submucosal

Pedunculated Intracavity

0

3

100% Intramural and endometrial contact

< 50% Intramural

1

2

$\geq 50\%$ intramural

Subserosal

6

Subserosal and < 50% intramural

7

Subserosal pedunculated

2 - 5

Submucosal, subserosal, and $\geq 50\%$ Intramural

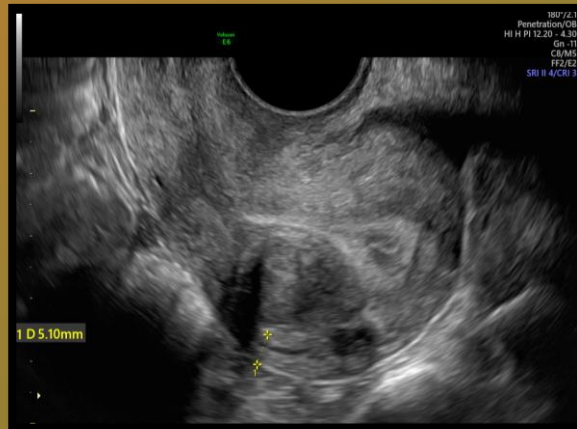
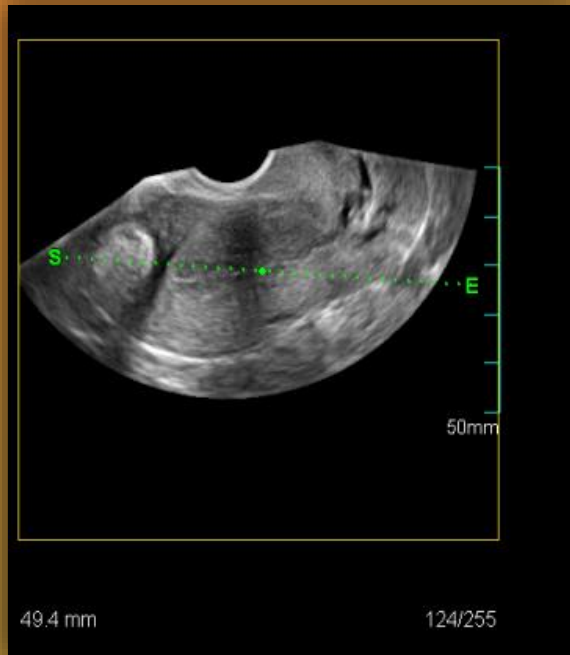
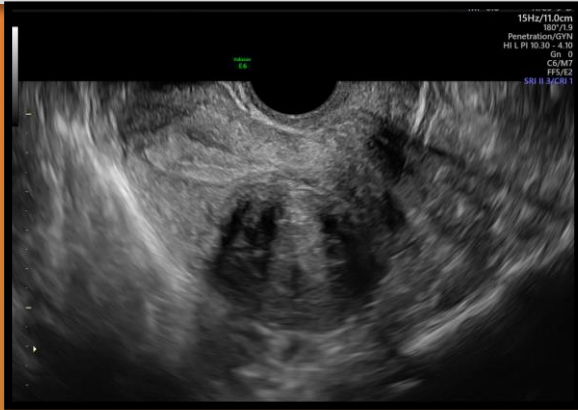
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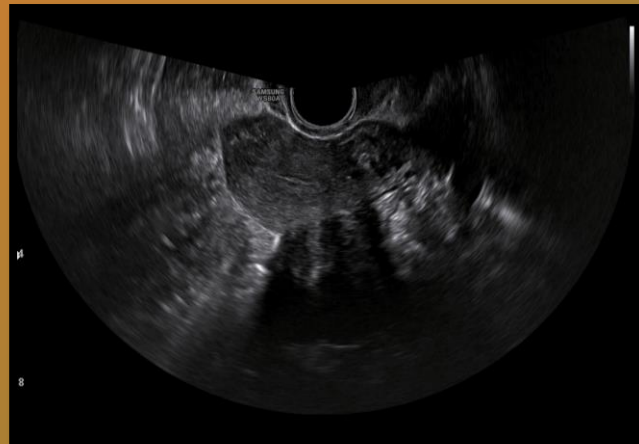
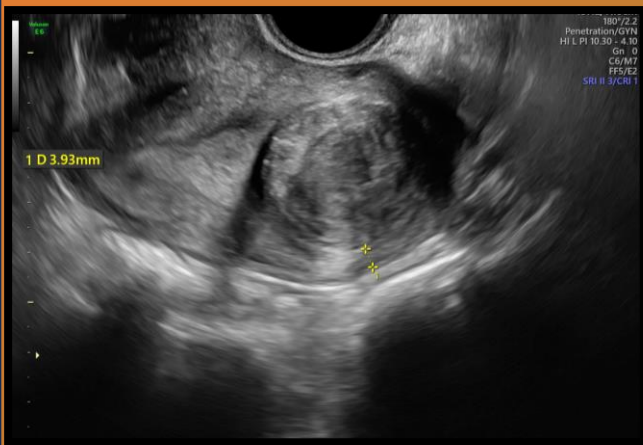
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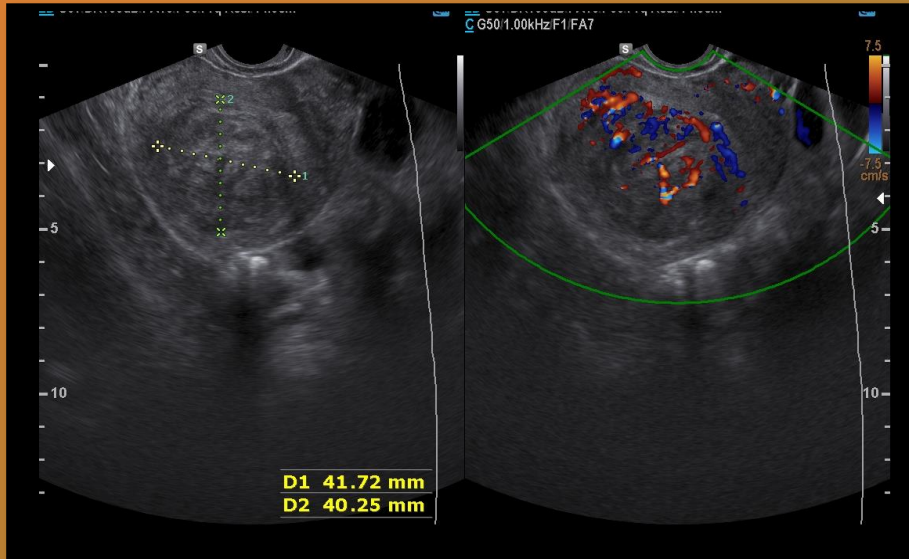
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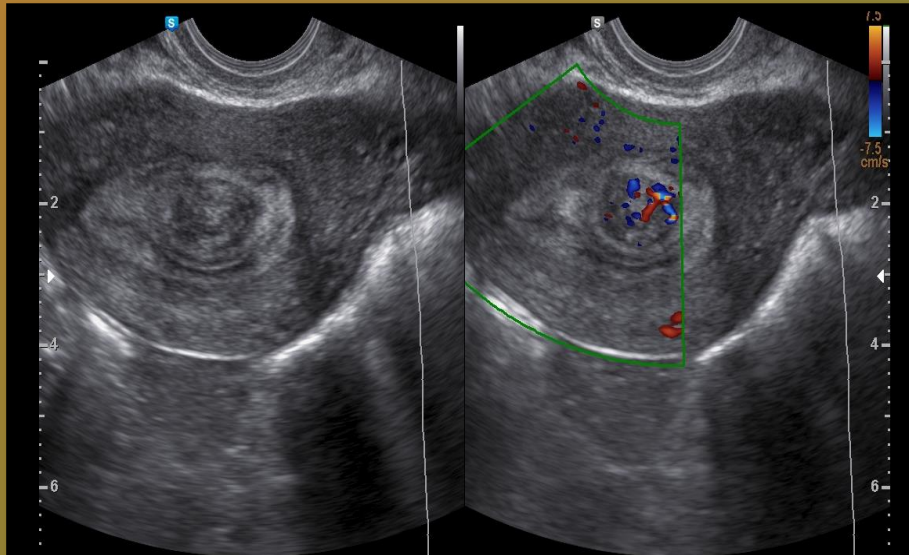
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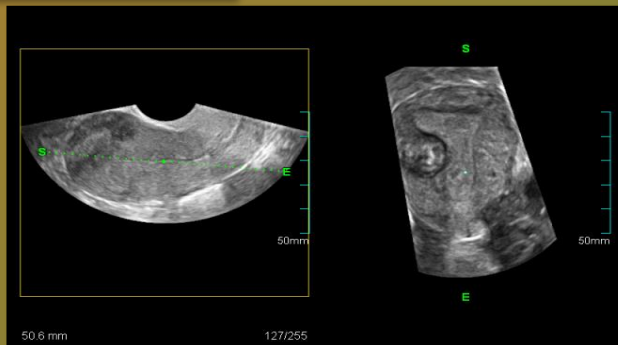
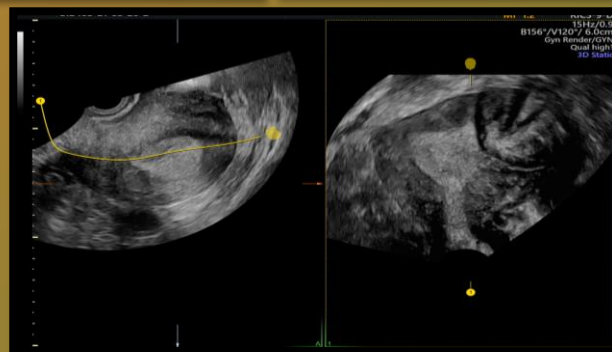
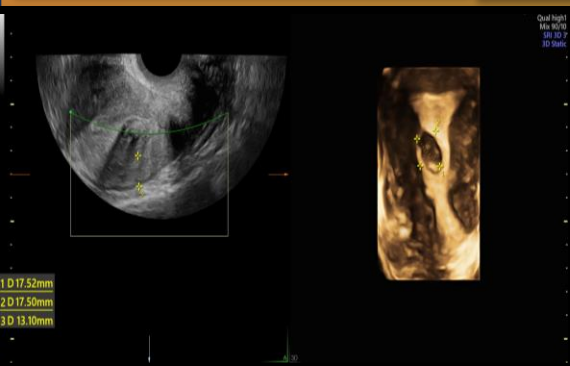
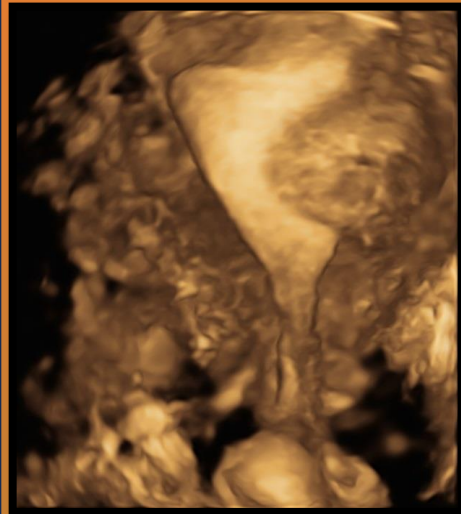


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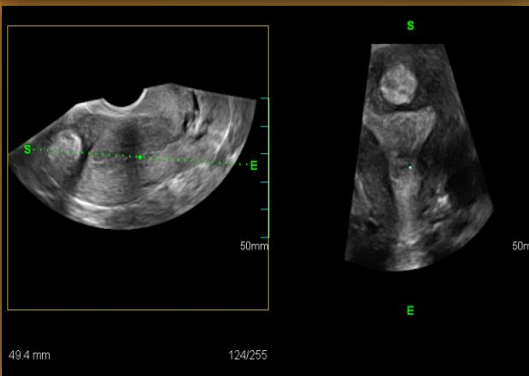


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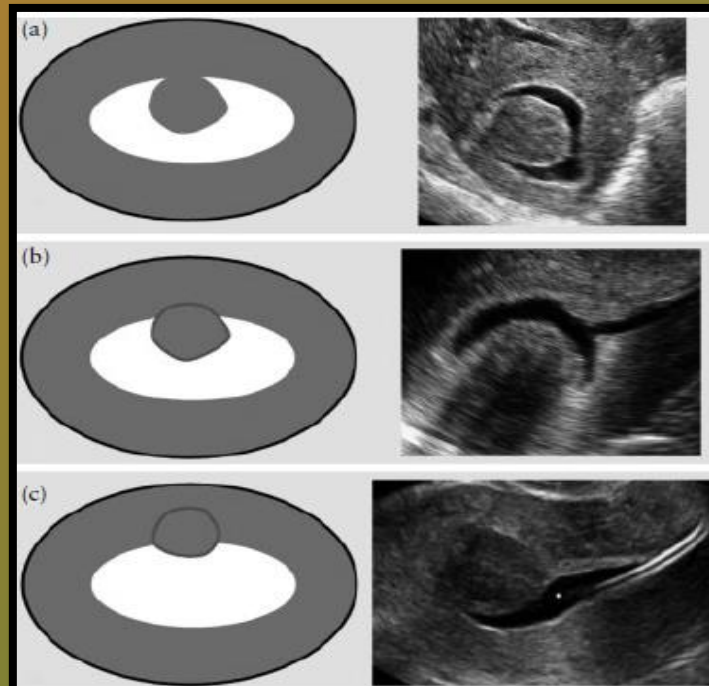


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Submucosal Myoma Grading

- G0: completely within cavity
- G1: >50% endocavitary protrusion
- G2: <50%



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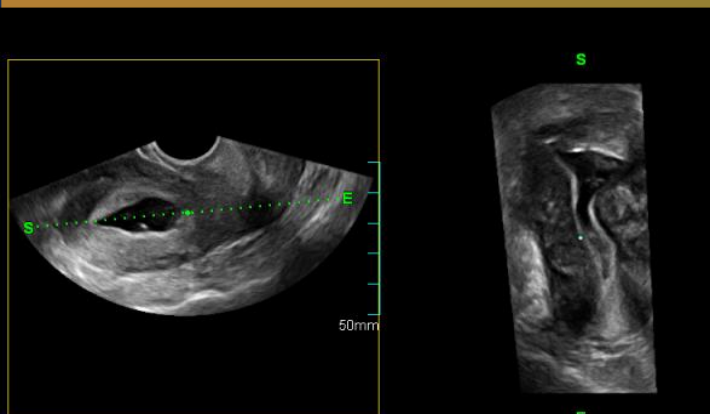
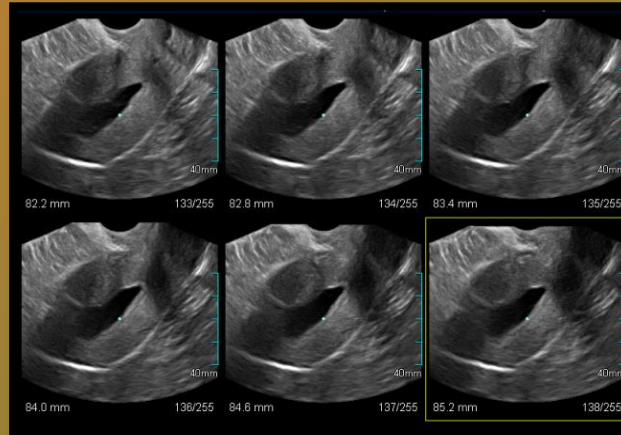
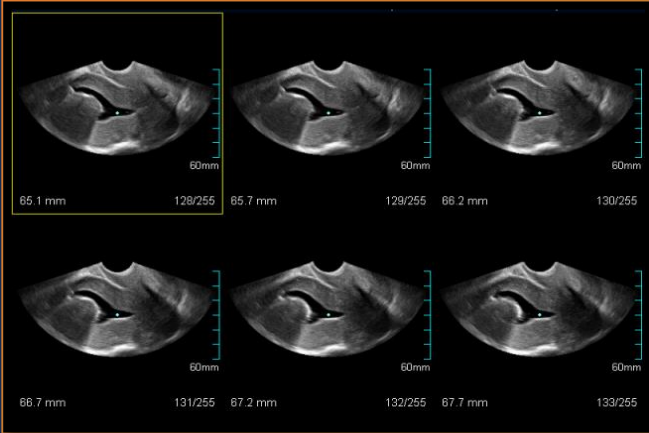


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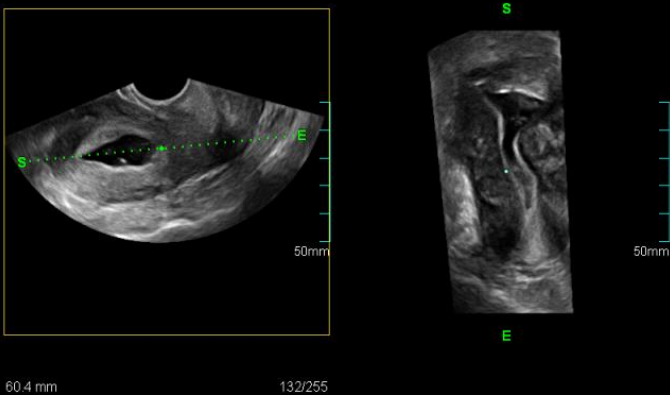
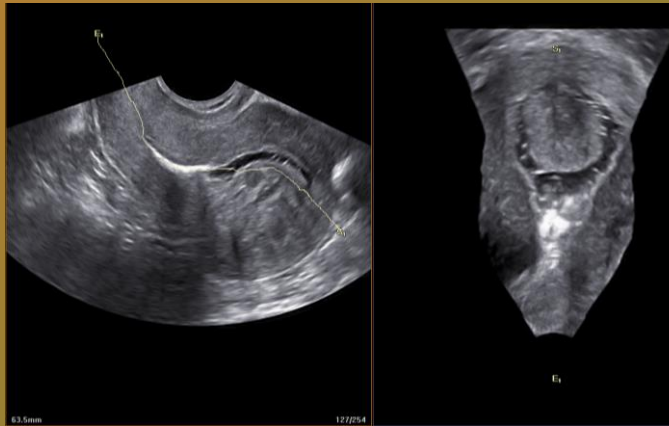
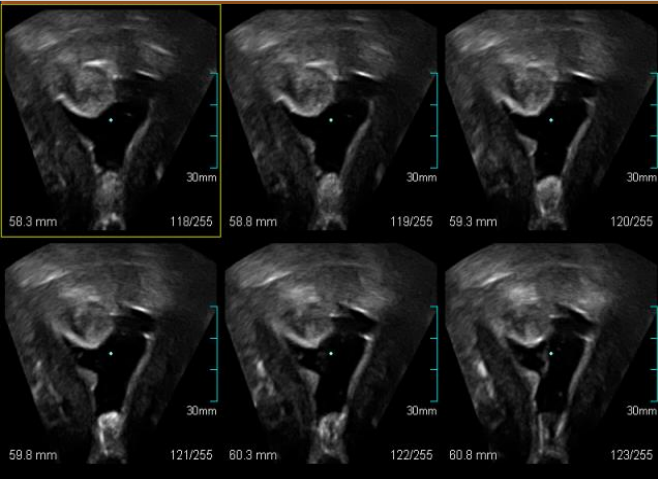
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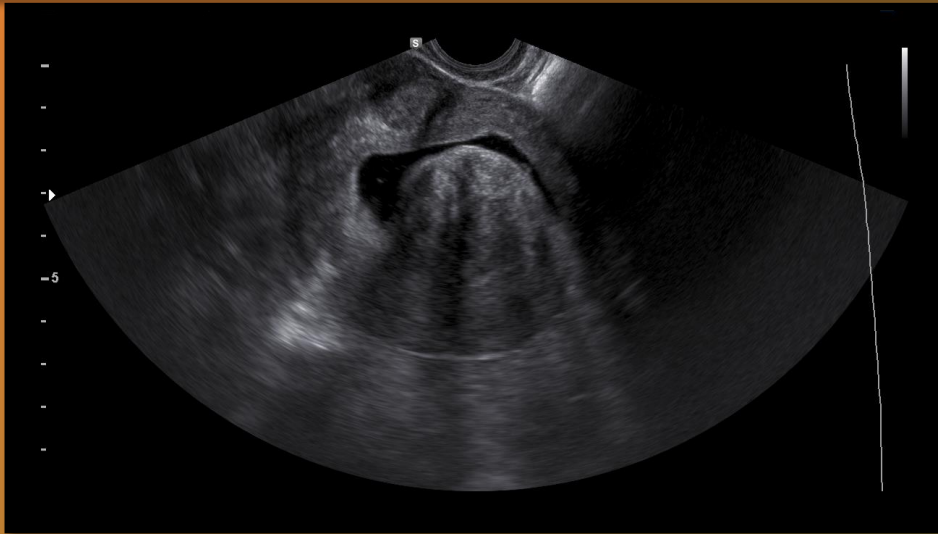
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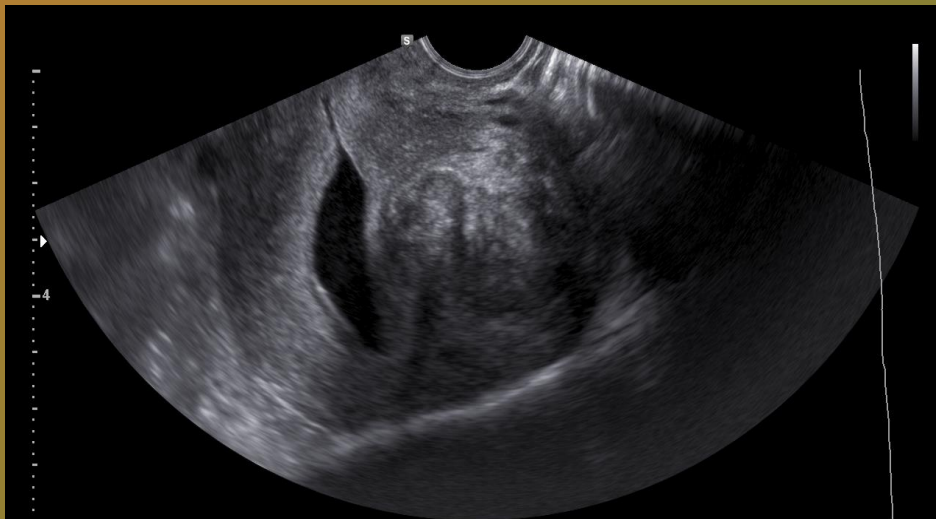


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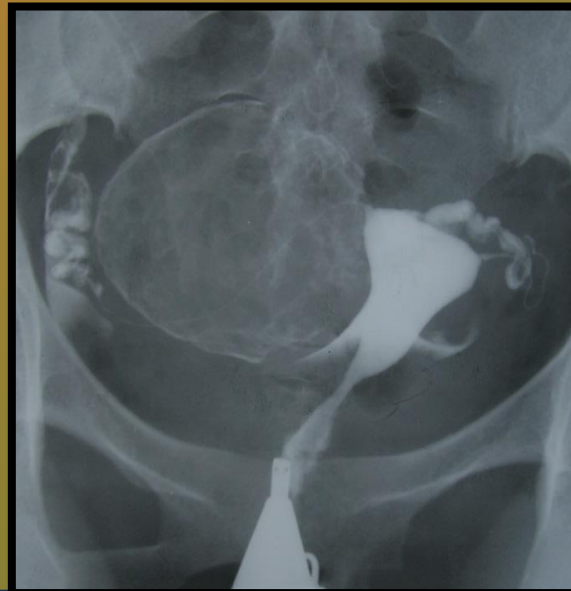
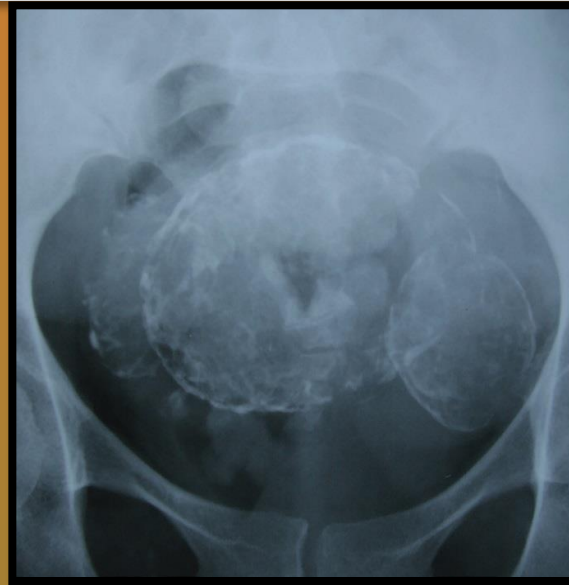
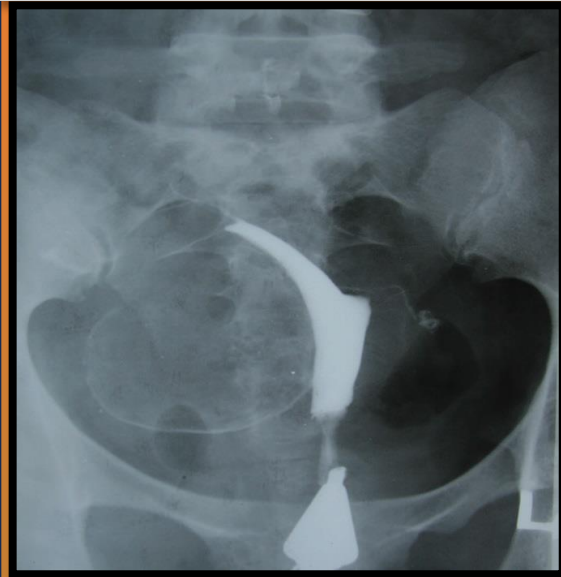
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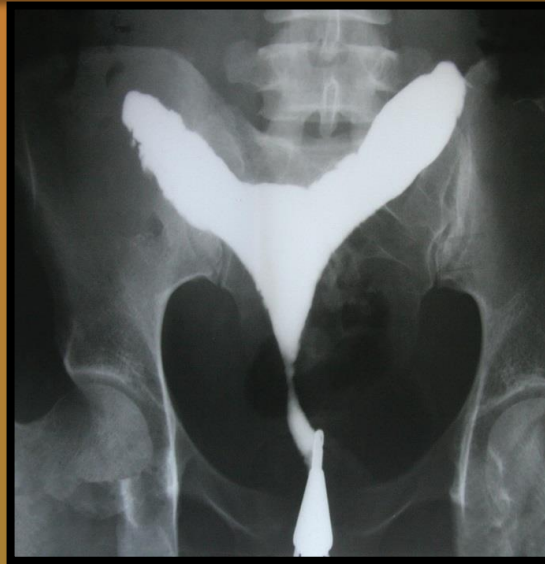
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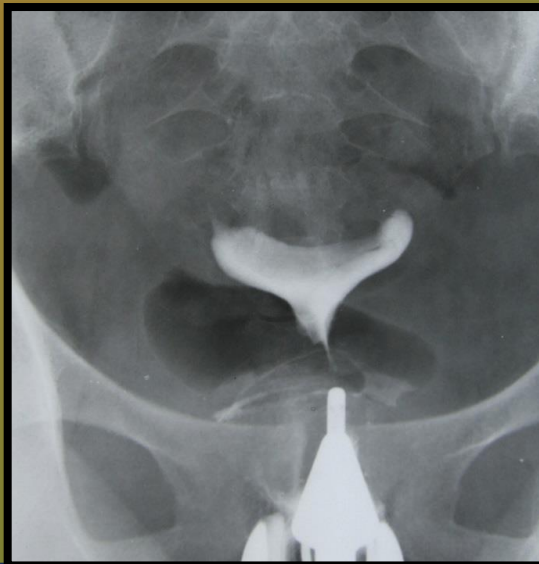
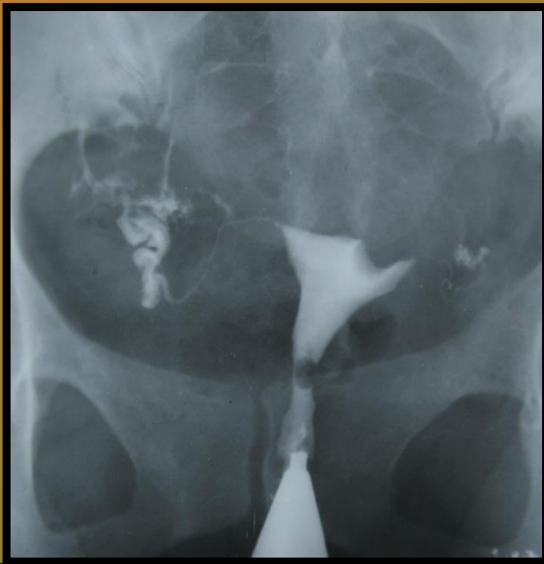


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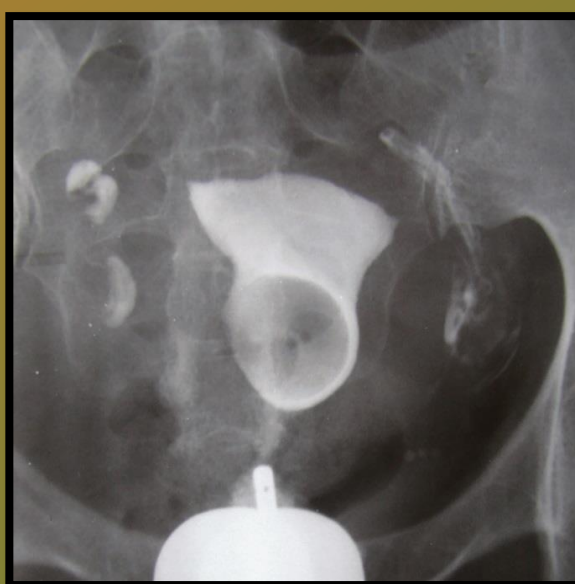
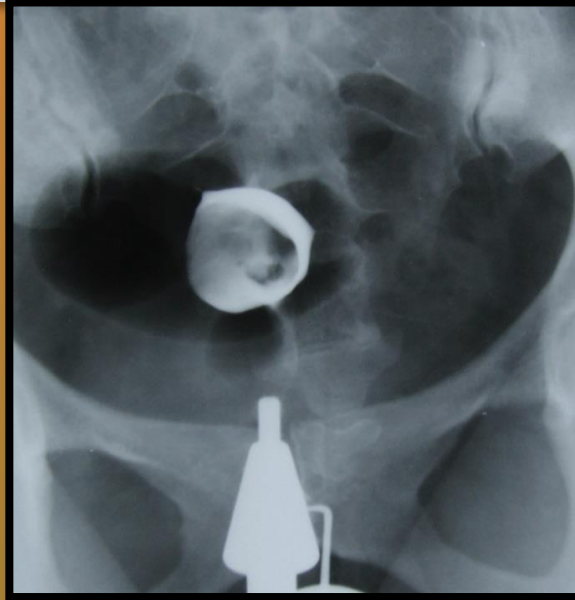
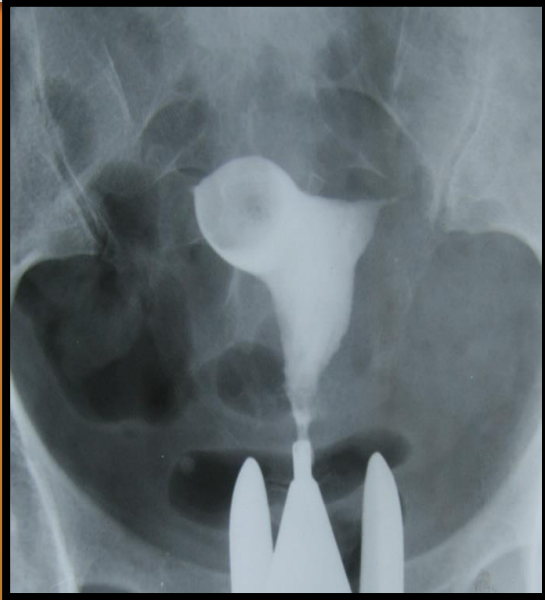
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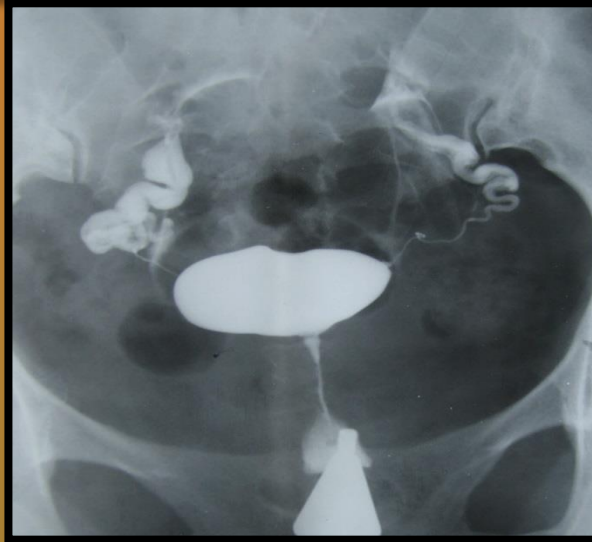
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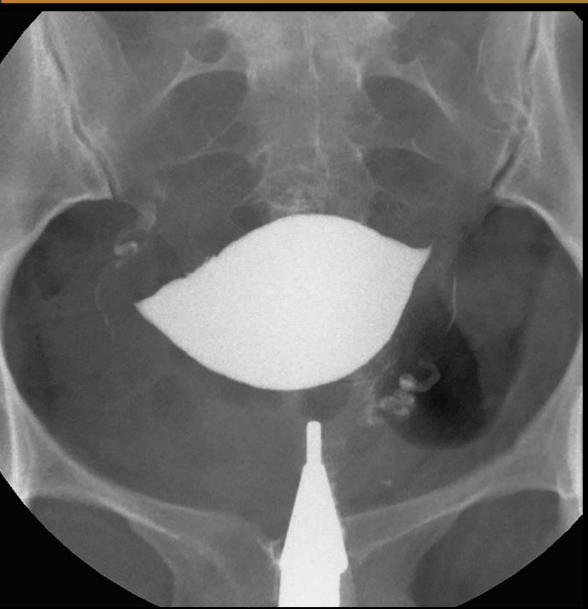


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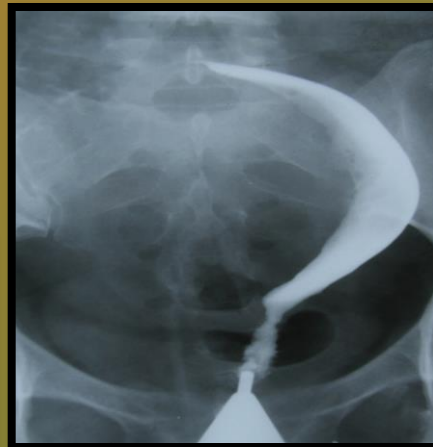
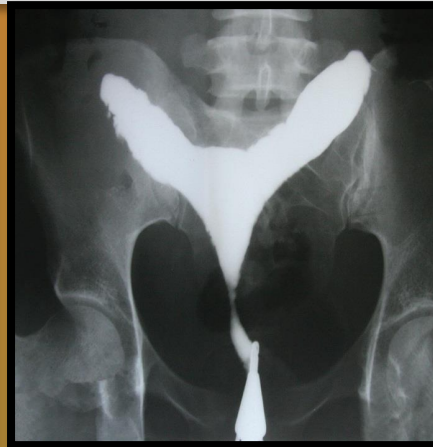
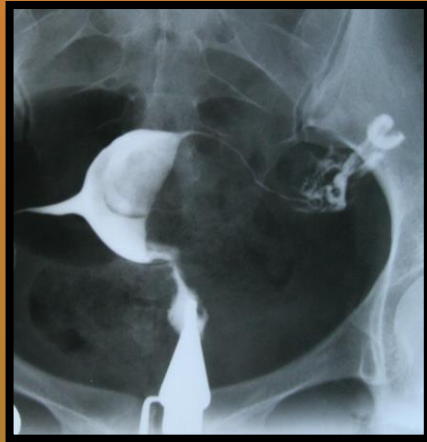
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MRI

- MRI is not generally required for diagnosis, except for complex or problem-solving cases. It is, however, the most accurate modality for detecting, localizing, and characterizing fibroids, being more sensitive than ultrasound. Size, location, and signal intensity should be noted.

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□ MRI is of significant value in the symptomatic patient when surgery and uterine salvage therapy are considered. It is also of great value in differentiating a pedunculated fibroid from an adnexal mass

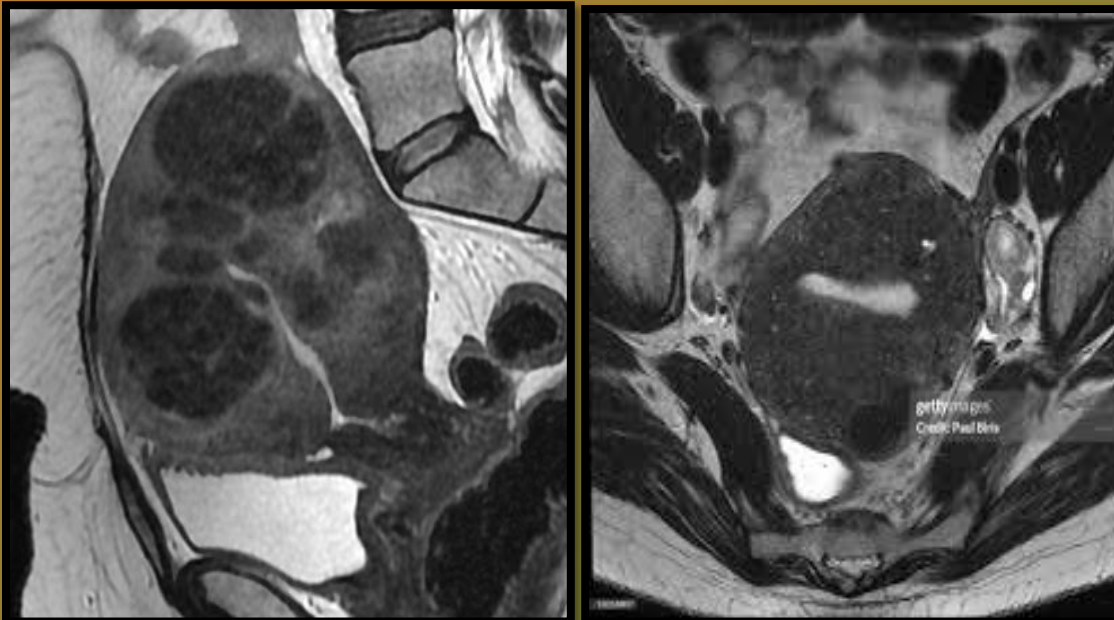
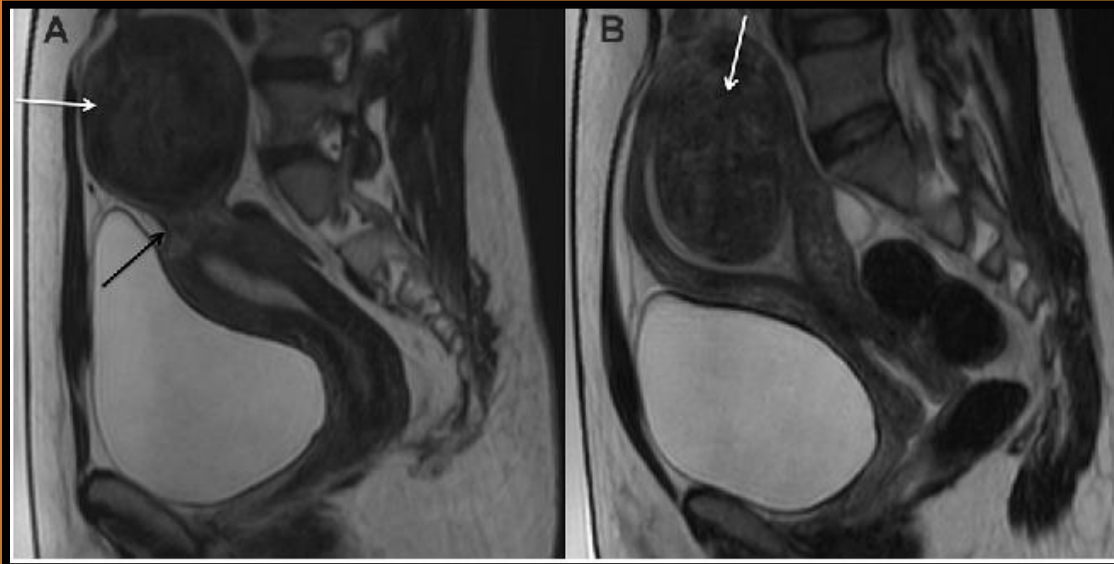
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CT

- Fibroids are usually seen as soft tissue density lesions and may exhibit coarse peripheral or central calcification
- They may distort the usually smooth uterine contour
- Enhancement pattern is variable

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Differential Diagnosis

General imaging differential considerations include:

Uterine leiomyoma

- Malignant transformation into leiomyosarcoma is rare.
- Unfortunately, no imaging modality can reliably differentiate a benign leiomyoma from the rare leiomyosarcoma

Uterine smooth muscle tumors of uncertain malignant potential: rare

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Differential Diagnosis

- Uterine lipoleiomyoma: greater fat content (sometimes considered a variant of a leiomyoma)
- Focal myometrial contraction (Braxton Hicks contraction): especially if seen during pregnancy
- Focal adenomyosis: less well-defined; color Doppler demonstrates tortuous vessels through the abnormality; no calcifications 4,17
- In occasional situations, it may be difficult to differentiate between uterine leiomyomas and:
 - Ovarian or adnexal masses (especially if the leiomyoma is pedunculated)
 - Endometrial carcinoma

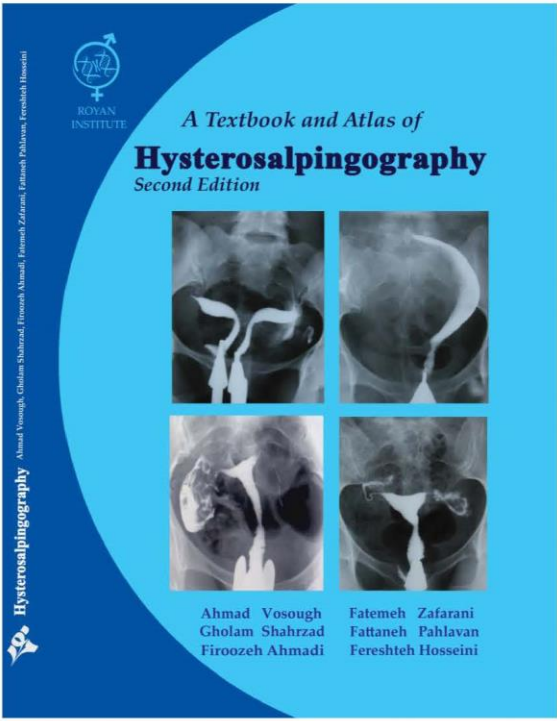
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A Textbook and Atlas of
2D/3D Hysterosonography



Firoozeh Ahmadi, Haadieh Haghighi, Maryam Javam

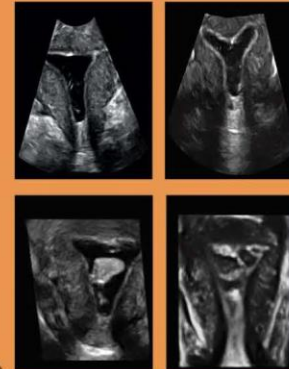
2D/3D Hysterosonography

About this book

This manual is a valuable illustrated textbook on "2D/3D hysterosonography" which provides detailed knowledge of common uterine abnormalities and endometrial lesions detected by SHG. More than two hundreds high-quality 2D/3D SHG images of infertile patients, women with AUB and etc., are provided in this book. This makes this manual unique & useful for all radiologists, gynecologists and residents or fellows, and other medical professionals who are deeply involved in this new field of diagnostic imaging.



A Textbook and Atlas of
2D/3D Hysterosonography



Firoozeh Ahmadi
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