Pelvic endometriosis

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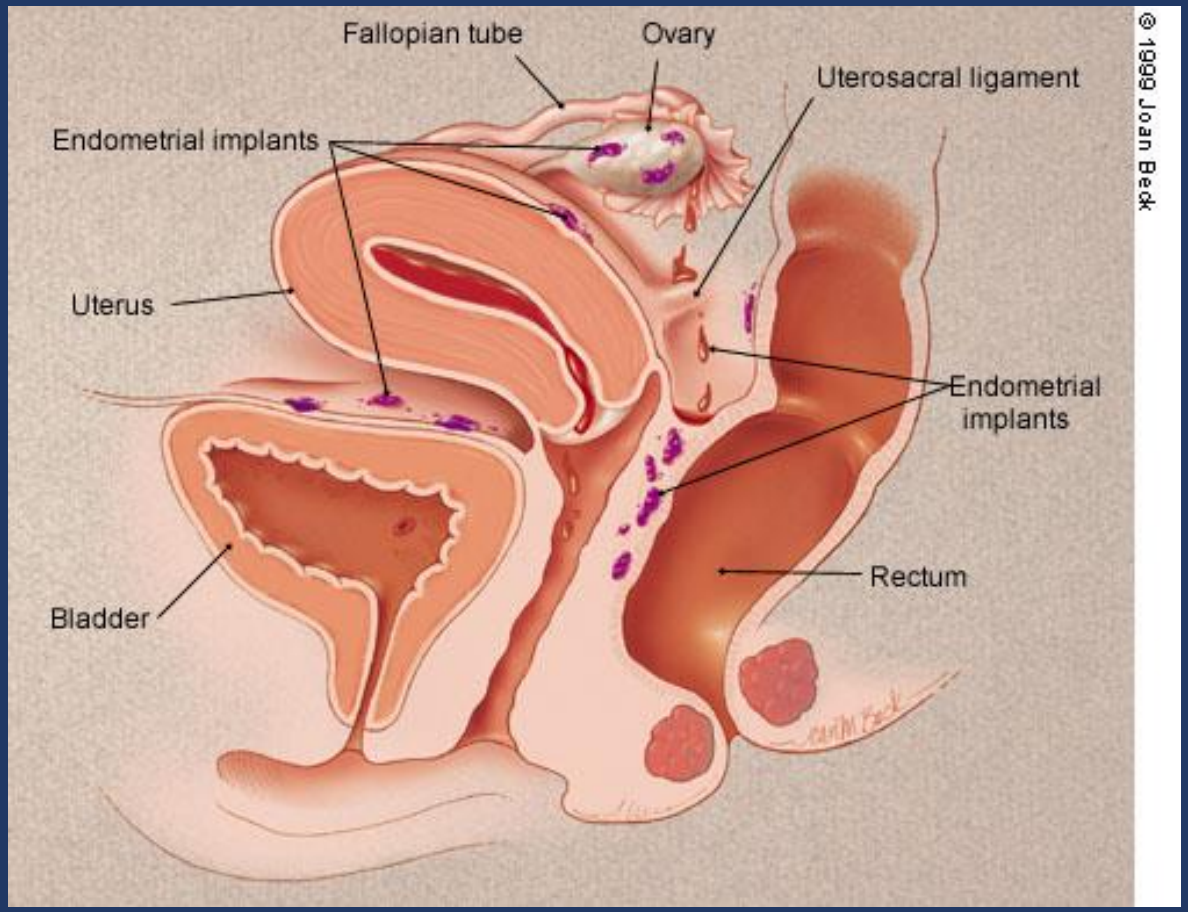
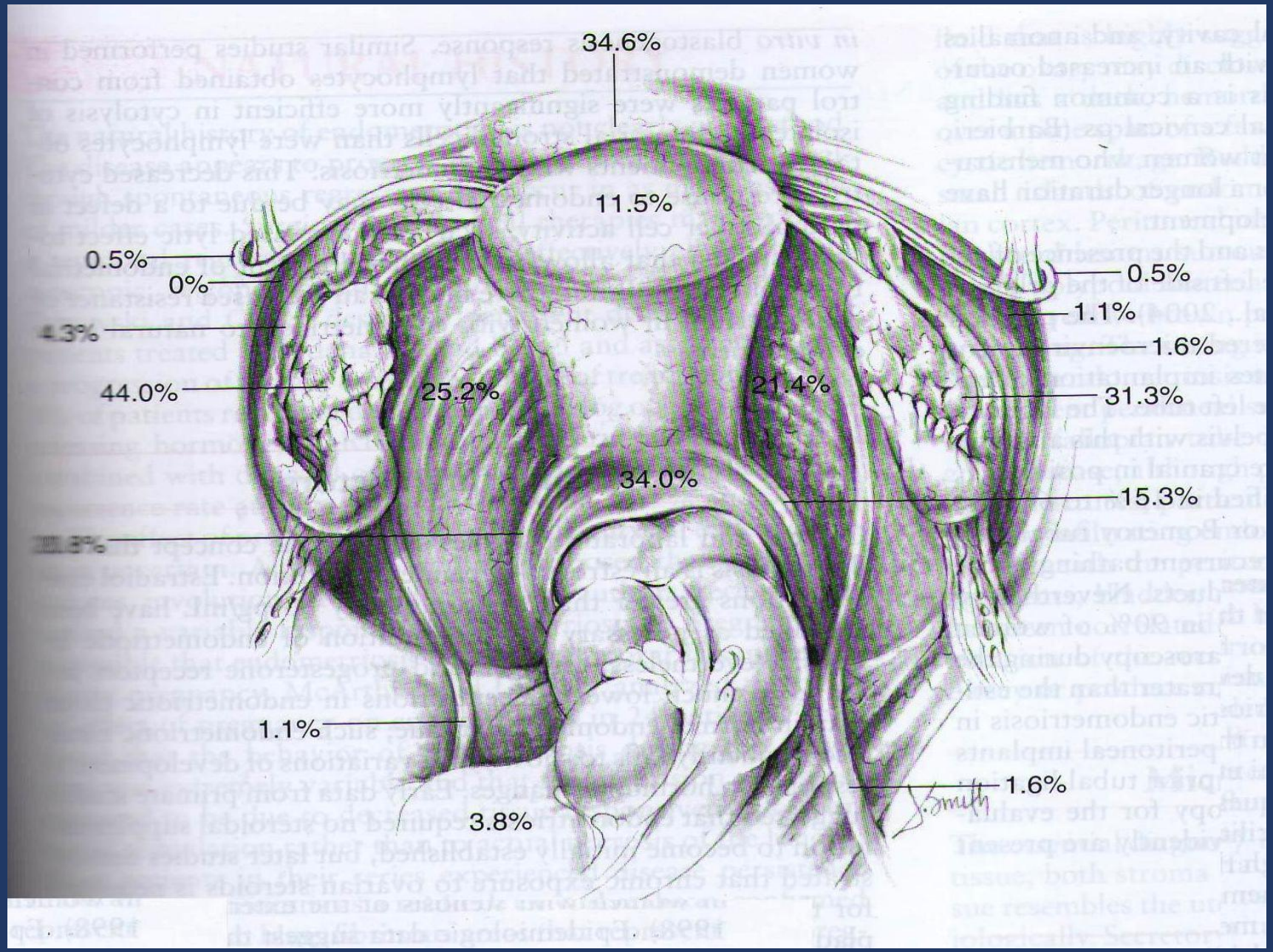
- Endometriosis is a chronic gynaecological disorder characterized by the presence of endometrial mucosa outside of the uterine cavity.
- It affects approximately 10% of women during reproductive age.
- It is found in 20–50% of women with infertility and approximately 90% of women with chronic pelvic pain.

Transplantation theory:

- Based on assumption that endometriosis is caused by implantation of the endometrial cells by transtubal regurgitation during menstruation.

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1.6%

Sites of endometriosis

- ***Pelvic***
  - Ovary
  - Cul de sac
  - Uterosacrals
  - Posterior surface of uterus
  - Posterior broad ligament
  - Rectovaginal septum
  - Tubes and round ligaments
- ***Extrapelvic sites***
  - Intestines (rectosigmoid, cecum, terminal ileum, proximal colon, appendix)
  - Lungs & thorax
  - Urinary tract
- ***Less common sites***
  - Cervix
  - Hernial sacs
  - Umblicus
  - Laparotomy/episiotomy sites
  - Tubal stumps after sterilization
- ***Rarest***
  - Extremities

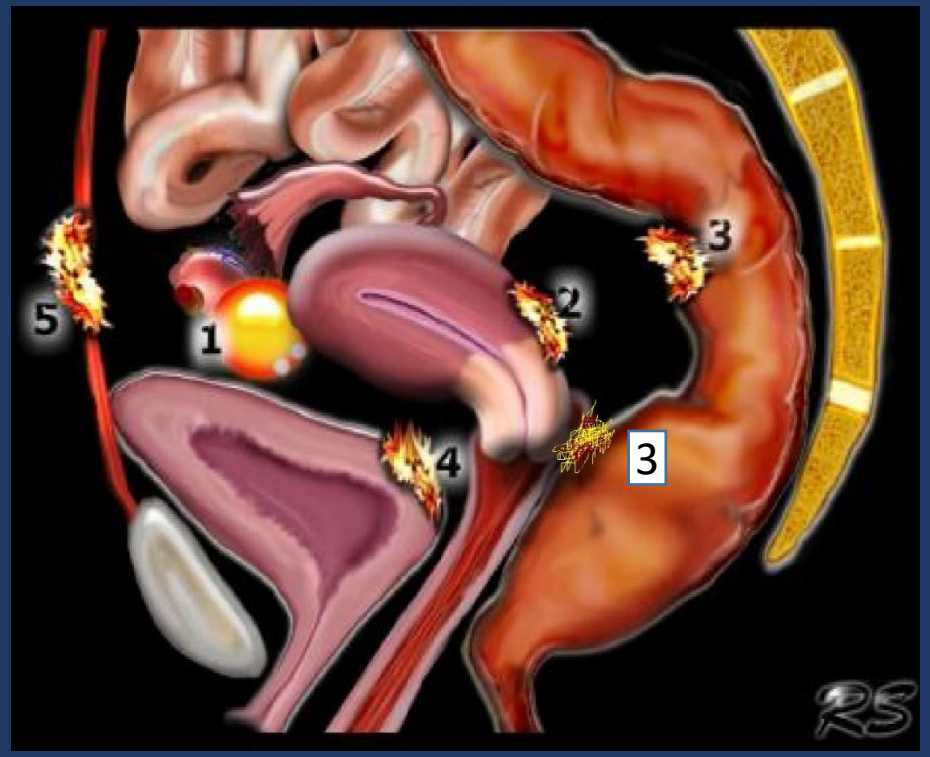
- Although laparoscopy continues to be the gold standard for the diagnosis of endometriosis, both ultrasound and MRI are increasingly being used, especially to evaluate deep disease.
- Imaging is useful in confirming the diagnosis and staging the extent of pelvic disease.
- Ultrasound (TAS and TVS)
- MRI is considered more accurate than ultrasound in viewing complex and severe cases of endometriosis.

- Ultrasound has been shown to have sensitivities and specificity above 90% for deep endometriosis, depending on location.
- MRI has been estimated that the sensitivity, specificity and accuracy is 90%, 98% and 96%, respectively, for the diagnosis of endometriomas and the differentiation of other gynecological masses.
- MRI can have a key role in pre-surgical mapping.
- Deep infiltrating endometriosis is a characterized by endometriotic tissue invasion to a depth of more than 5 mm.
- Sign may result in obliteration of anatomic compartments secondary to fibrosis and adhesions.

The imaging findings of endometriosis relate to

- 1/ direct visualization of the ectopic endometriotic deposits
- 2/ the fibrosis and regional anatomical distortion which occurs due to repeated cycles of haemorrhage and inflammation.

Typical localizations of endometriosis:



1.ovarian endometrioma
2.retrocervical endometriosis(Adhesions at the base of the Pouch of Douglas}
3.deep bowel endometriosis (Rectosigmoid and rectovaginal septum)
4.bladder endometriosis (Adhesions in the vesicouterine space)
5.abdominal wall endometriosis

Endometriosis:

Superficial endometriosis

Deep endometriosis

The main manifestations of endometriosis

- hemorrhagic ovarian cysts (endometriomas)
- fibrotic nodules
- sub-peritoneal and in other locations adhesions

Ultrasound

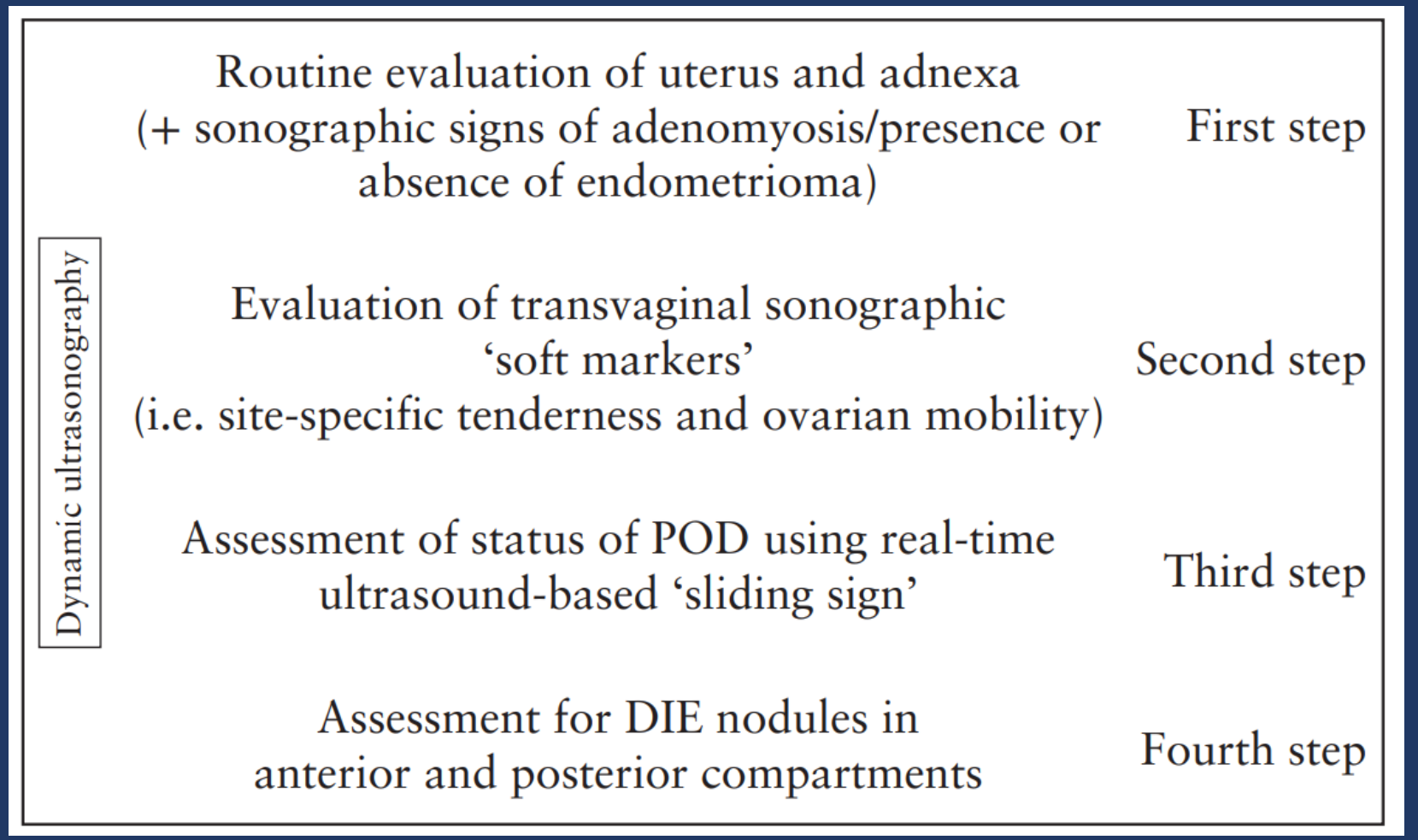
Disadvantage

- First-line procedure
- Accessible
- Cheap
- Faster assessment
- Real-time interaction with pelvis structures (assessment of pain and organ mobility)
- No radiation
- Helpful for the assessment of ovarian endometriomas and bladder endometriosis

Disadvantage

- Operator dependent
- View field limited to the focal length of the probe
- Nonspecific to establish differential diagnosis with other ovarian lesions
- Common conditions that may impair lesion visualization are large ovarian cysts, subserosal leiomyomas, and acute retroflexion of the uterus.

In addition, severe pelvic adhesions and other distortions of the pelvic anatomy may limit TVS evaluation of the pelvic region



POD: pouch of Douglas
DIE: deep infiltrating endometriosis

ovarian endometriomas

- typically unilocular cystic lesions containing uniform low-level echoes (ground glass appearance)
- no blood flow on color Doppler (color score 1)
- maybe single or multiple
- can have an atypical appearance including multiple locations and papillary projection
- ‘kissing’ ovaries sign describes ovaries that are adherent to one another posterior to the uterus and is frequently seen with bilateral endometriomas.

Ultrasound finding

Transabdominal ultrasound has classically been described as a very limited technique for assessing endometriosis beyond the detection of ovarian endometriomas.

Transvaginal ultrasound

- Transvaginal ultrasound has the ability to dynamically assess mobility and site-specific tenderness, known as 'soft markers' for endometriosis, suggestive of superficial disease and pelvic adhesions.
- The loss of the sliding sign on transvaginal ultrasound assessment indicates obliteration of the pouch of Douglas.

Sliding sign

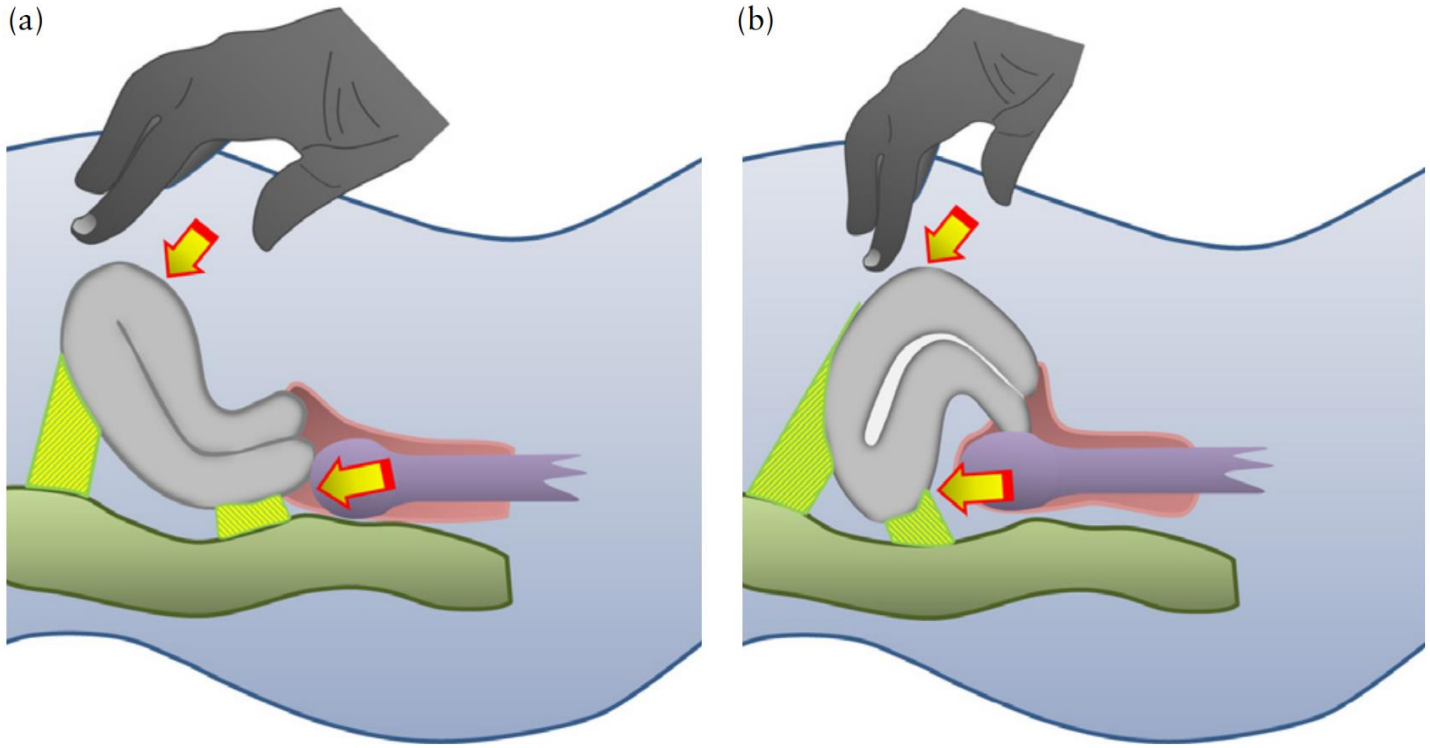


Figure 2 Schematic drawings demonstrating how to elicit the 'sliding sign' in an anteverted uterus (a) and a retroverted uterus (b).

Sliding sign positive

Sliding sign negative

ground glass appearance

no color flow

atypical appearance including papillary projection

kissing’ ovaries sign

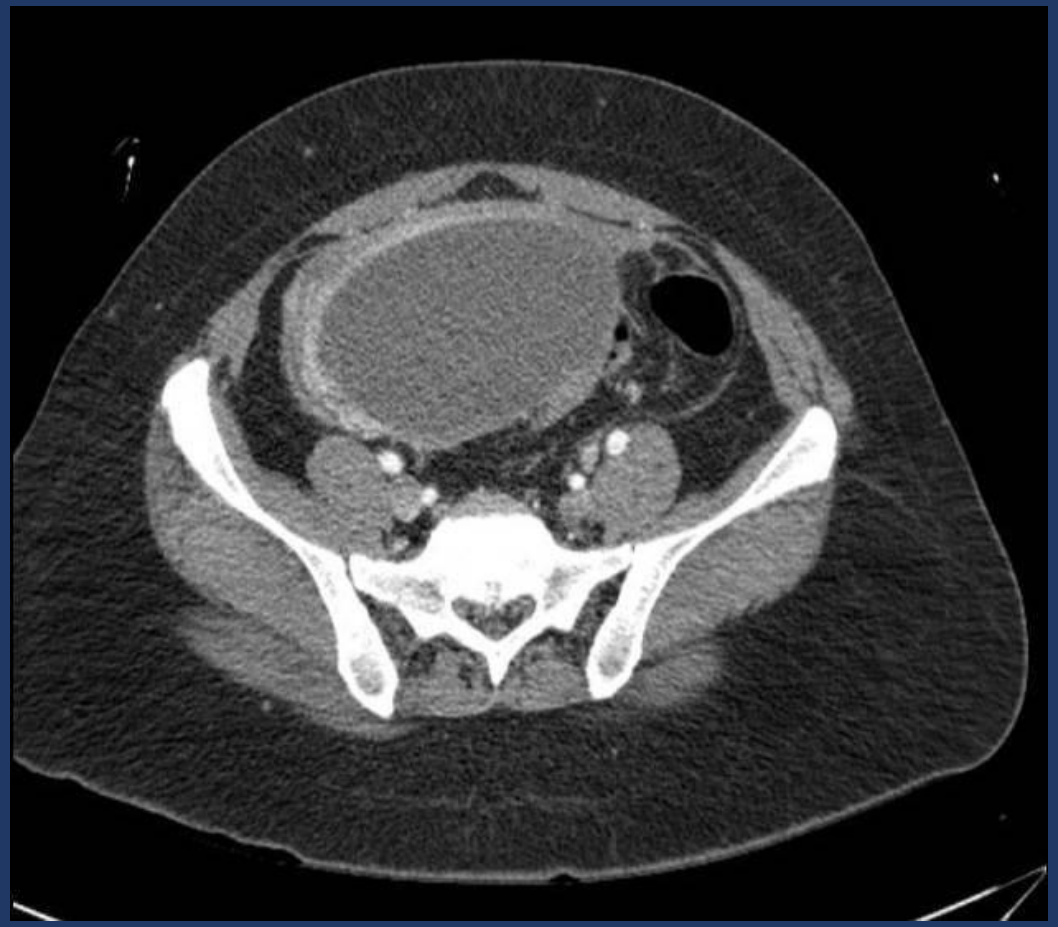
Nodule

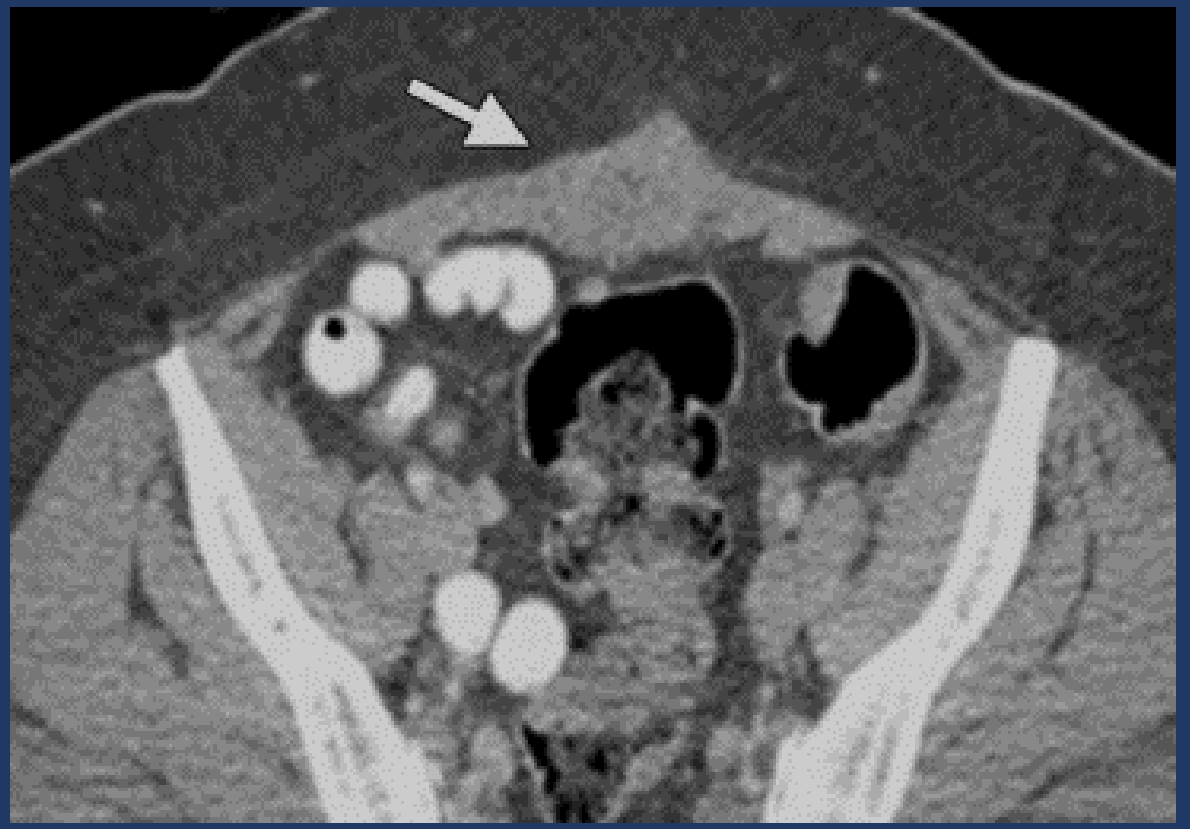
Adenomyosis

DD: hemorrhagic cyst

Dermoid cyst

Ct scan:





MRI

- The patient is fasted for four hours
- Moderately filled bladder
- Transvaginal gel is not typically employed
- At the time of imaging, a spasmolytic agent (hyoscine 40 mg IV in 2 mL) is administered (unless contraindicated), to reduce image degradation from regional peristalsis.

Superficial endometriosis (Sampson's syndrome)

- These patients tend to have minor symptoms and usually also less structural changes in the pelvis.
  At laparoscopy, these implants may be seen as superficial powder-burn lesions.
- On MRI these lesions are most often not visible because they are tiny and flat, and therefore undetectable.
- when they exceed 5mm or when they appear as hemorrhagic cysts, showing high signal intensity on T1 and low signal intensity on T2-weigthed images, they may be detected.
- TVS and MRI are not sensitive for detection of this lesion.

Deep peritoneal endometriosis

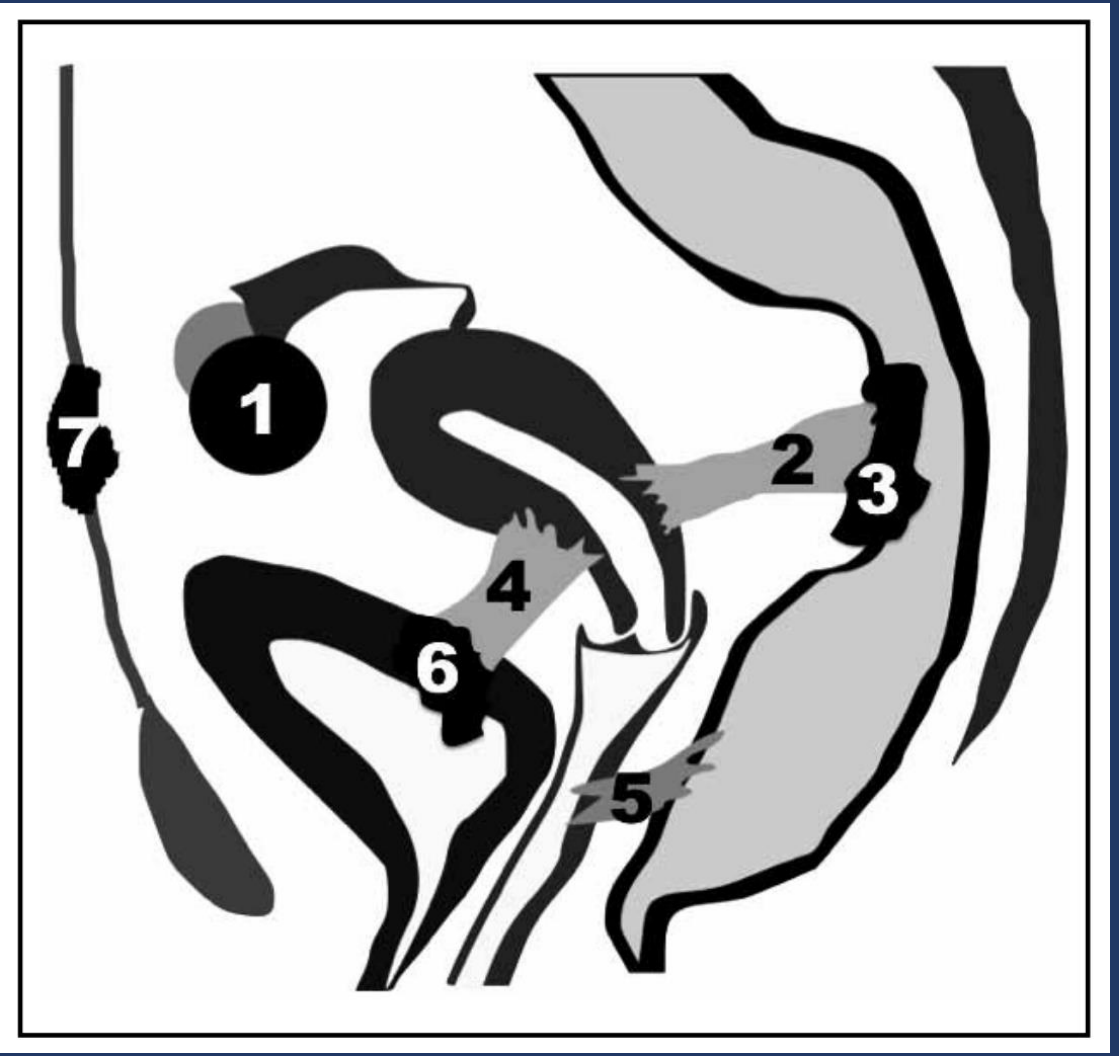
- Deep endometriosis corresponds to implants at a depth of more than 5 mm.
- Unlike endometriomas, deep endometriosis implants may have different characteristics on the MR image.
- Most of these are hypointense on T1 andT2-weighted sequences.
- It is due to a desmoplastic reaction with fibromuscular proliferation.
- They have poorly defined borders with infiltrative appearance, causing retraction of organs or surrounding structures.
- The presence of hemorrhagic foci, hyperintense on T1 sequences is a very characteristic MRI finding for endometriotic implants, but is seen less often in deep implants than in adnexal lesions.

Classification of deep endometriosis according to pelvic location

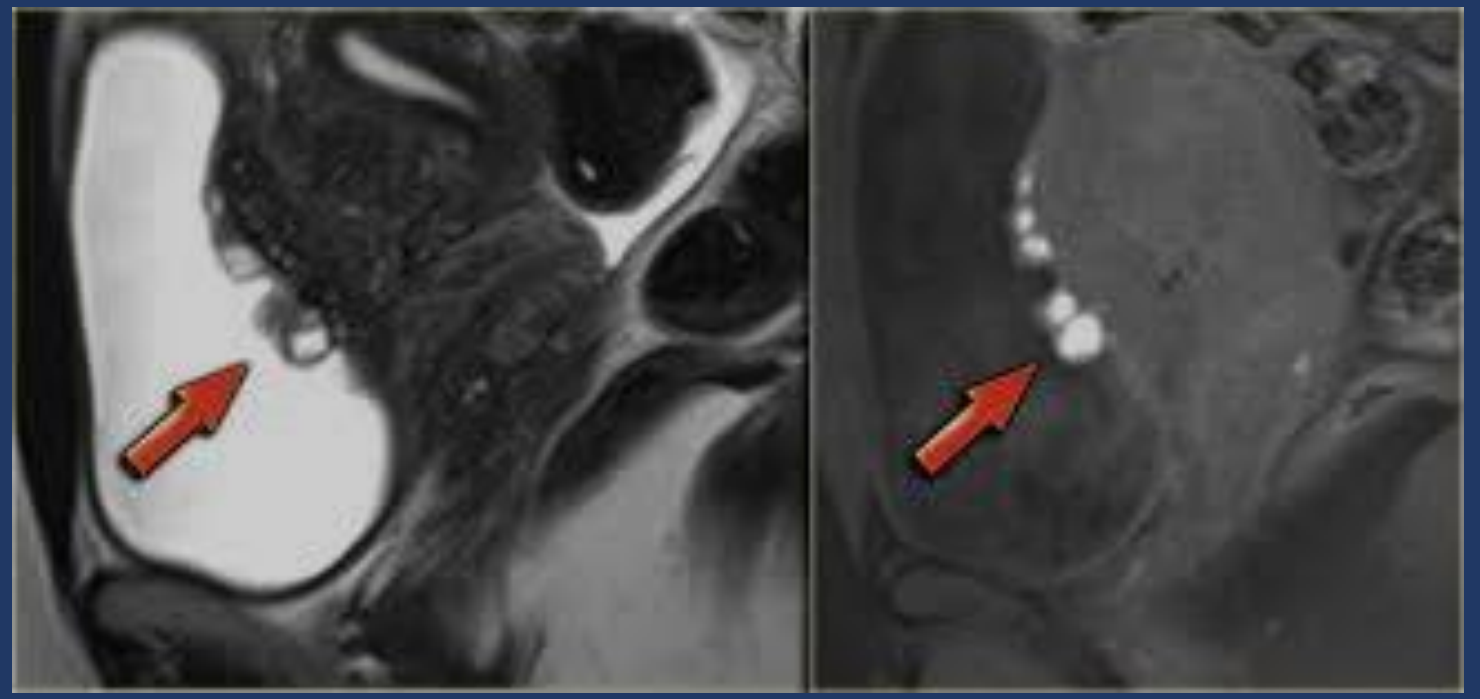
Anterior: Virtual space located between the anterior face of the uterus and posterior wall of the bladder, including urinary bladder, urethra, vesicouterine pouch and vesicovaginal septum.

Middle: Between the anterior and posterior compartment, including the uterus, fallopian tubes, ovaries and broad ligament.

Posterior: Virtual space located between the posterior vaginal wall and the anterior rectal wall, affects the rectovaginal septum, uterosacral ligaments, uterine torus, pouch of Douglas and rectosigmoid.



Anterior Compartment

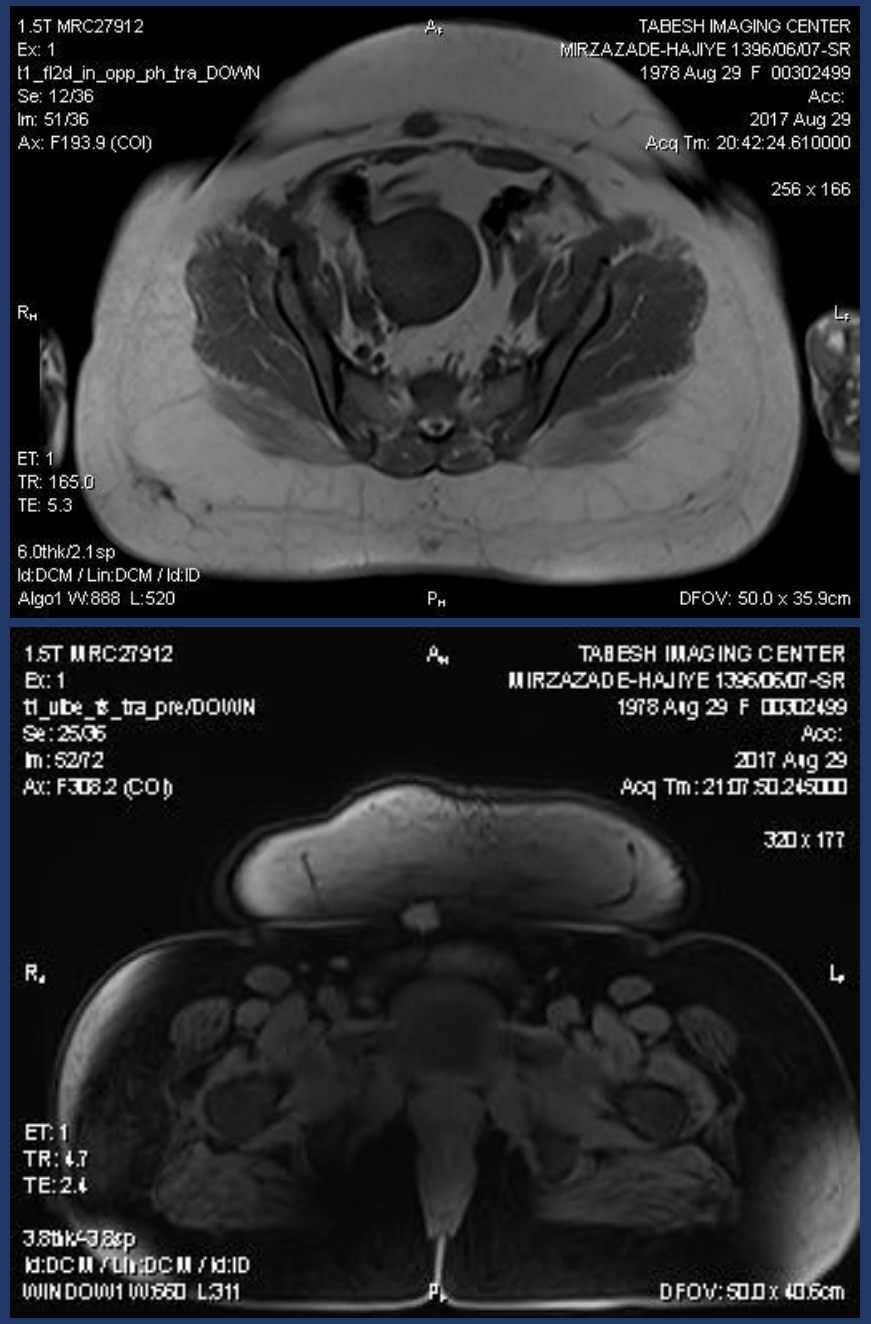


Middle compartment

- contains the female genital organs such as the ovaries, fallopian tubes, uterus, the broad ligaments and vagina’
- The most common affection in this compartment is at the level of the ovaries as Endometriomas.

Endometriomas

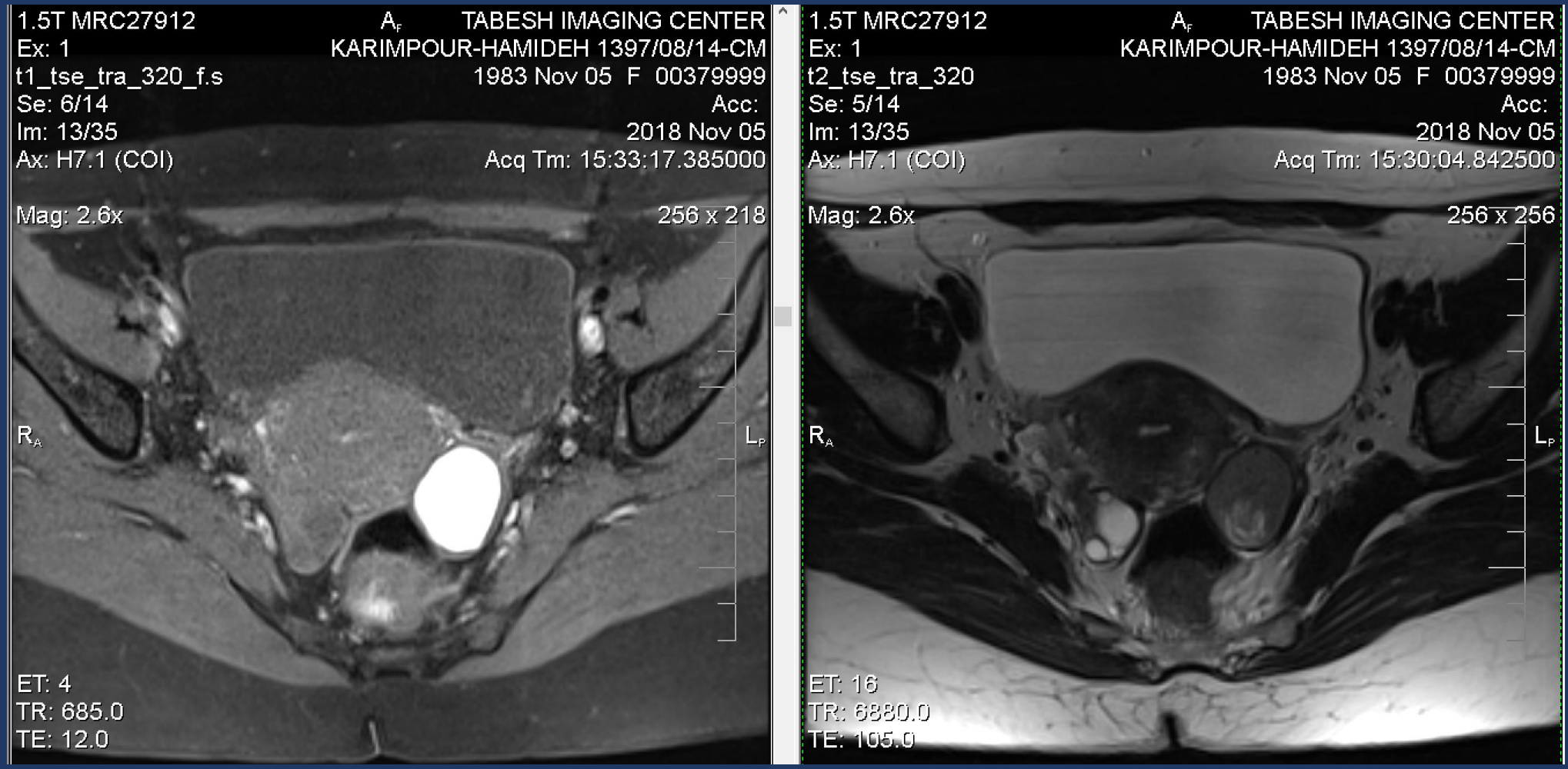
- Endometriomas are cysts that occur in the ovaries, the result of repeated cyclic hemorrhage.
- The ovarian endometriomas are typically hyperintense on T1-w sequences.
- This hyperintensity is most obvious on T1-weighted fat suppression, by eliminating the high signal from surrounding fat, thereby increasing the sensitivity for detection of small foci of endometriosis.
- T2w “shading” (the presence of blood in various stages).



shading sign

- **Shading sign** is an MRI finding typically seen in an endometrioma.
- The sign is seen on T2-weighted sequences of lesions that are hyperintense on T1, and consists of low signal (T2 shortening) affecting variable portions of the cyst.
- The signal is due to the high concentration of protein and iron within the endometrioma from recurrent hemorrhage.
- It may involve only a small portion of the cysts, typically layering dependently. Alternatively, it may involve the entire cyst.
- The degree of shading can vary from faint to complete signal loss.

T2 shading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Se: 6/14
Im: 13/35
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Mag: 2.6x
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ET: 4
TR: 685.0
TE: 12.0
1.5T MRC27912
Ex: 1
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2018 Nov 05
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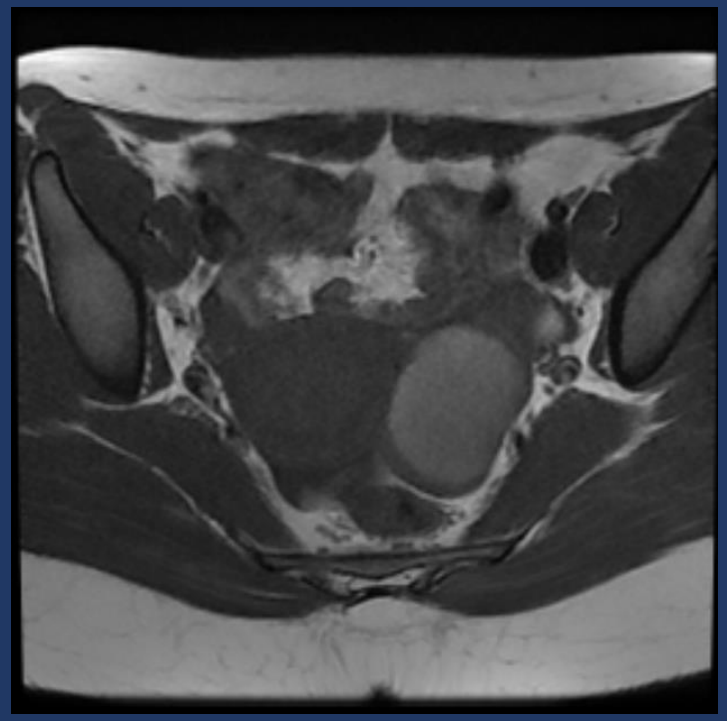
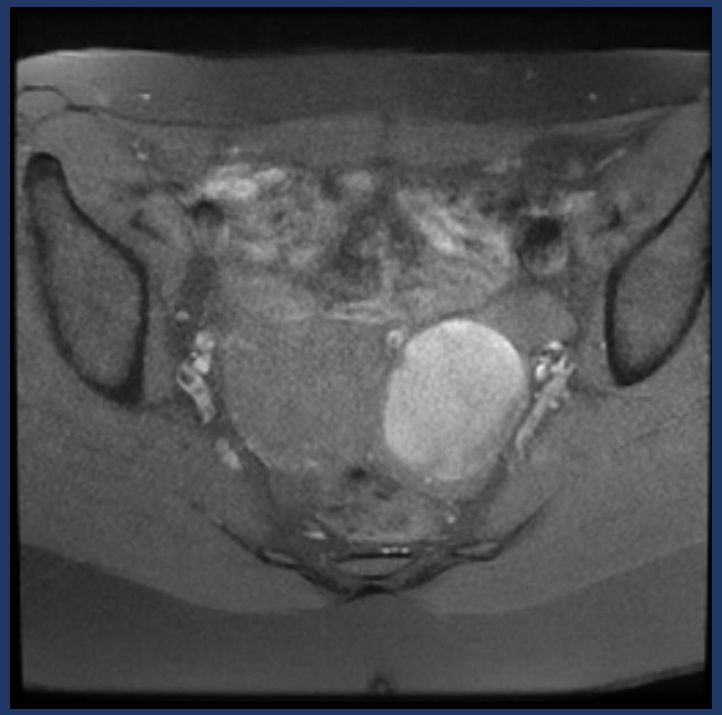
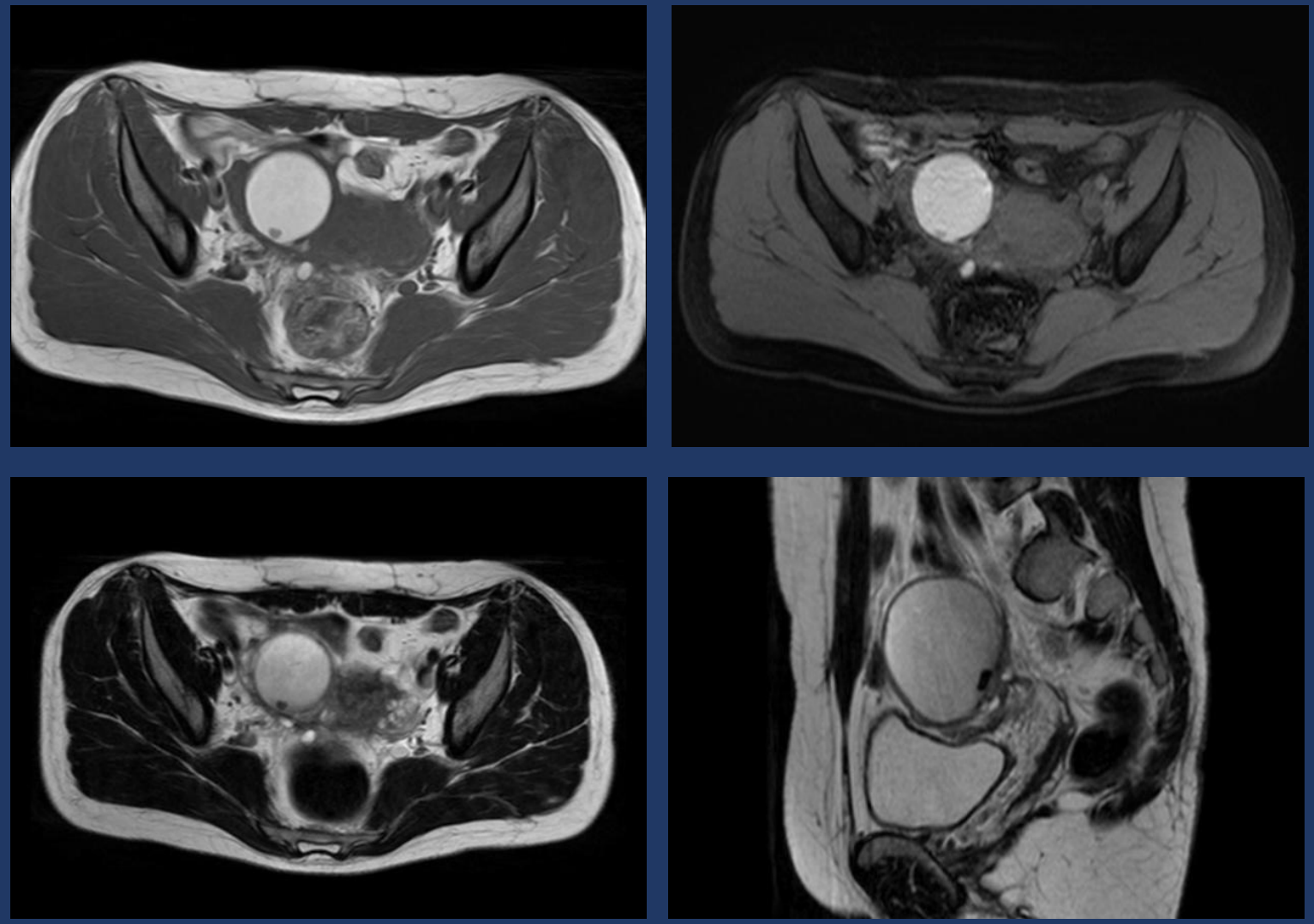
T2 shading (layering dependently)



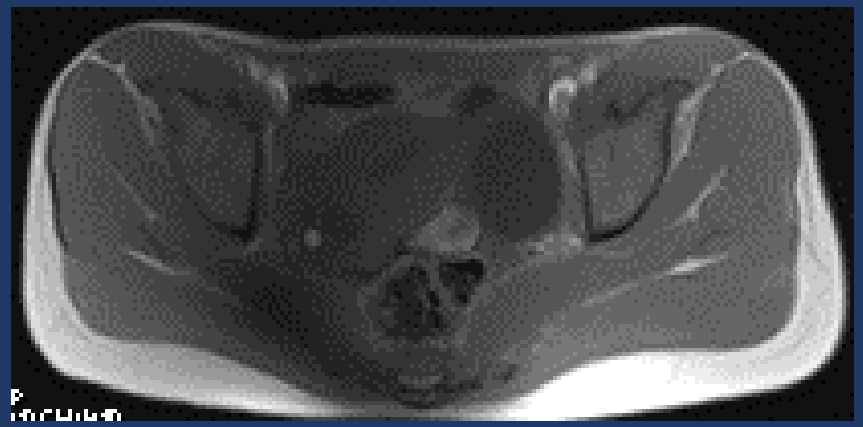


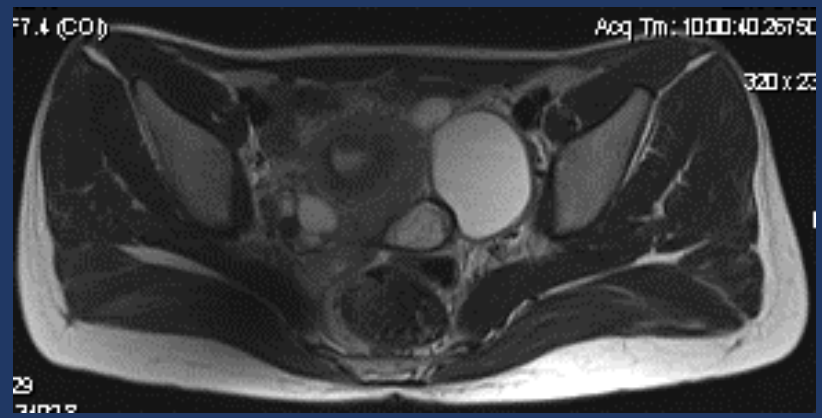
T2 dark spot sign

low T1 and T2 due to tissue and hemosiderin-laden macrophages.
T2 dark spot sign is specific for chronic hemorrhage and is helpful in diagnosing endometriomas



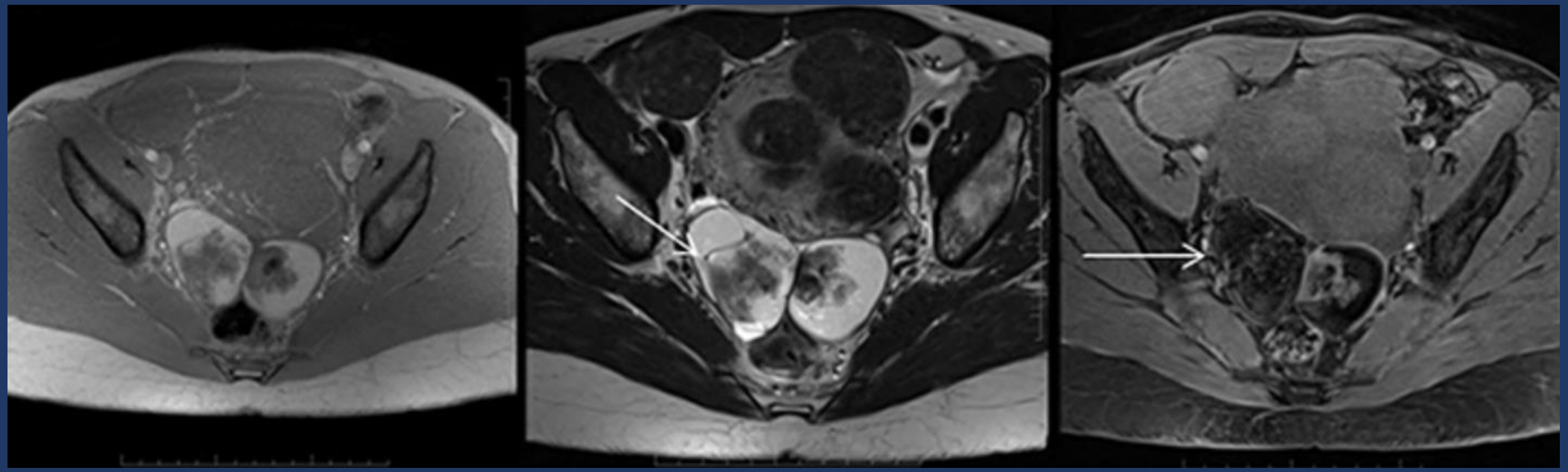
Differential diagnosis: hemorrhagic cyst





hemorrhage evolves from the center of the cyst and then extends peripherally (the center may show chronic stage of hemorrhage while the periphery is more subacute)

Differential diagnosis: dermoid cyst

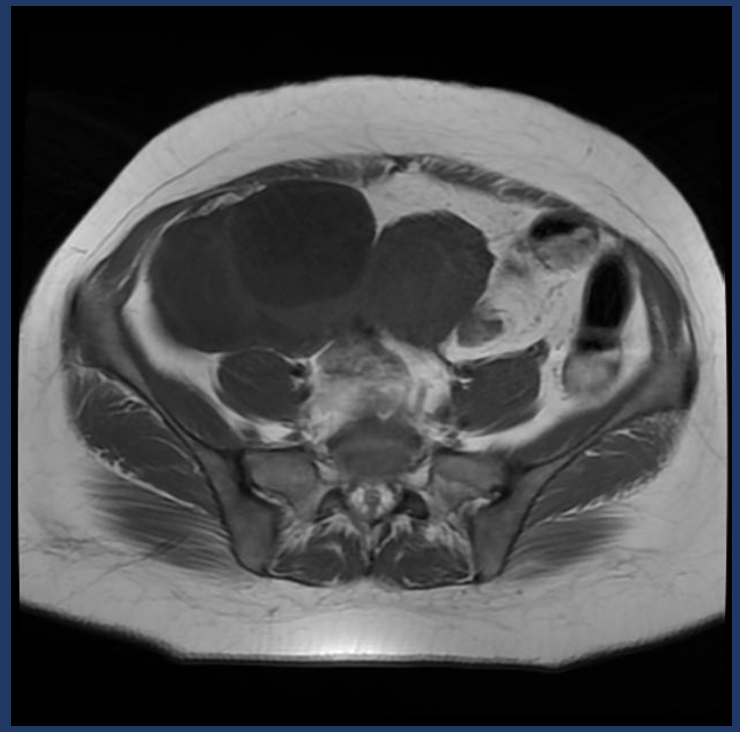


T1

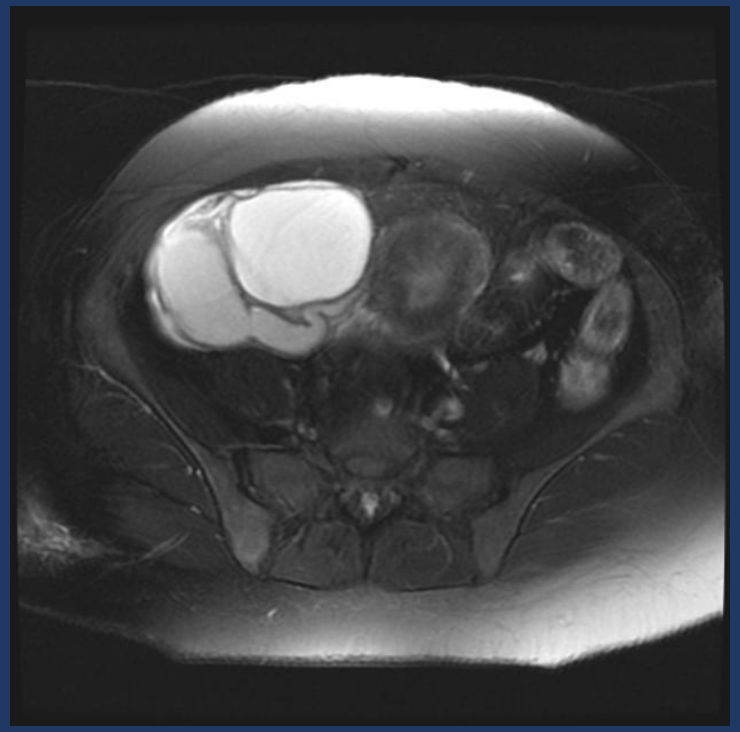
T2

T1 FS

Differential diagnosis: Pyosalpinx



T1



T2

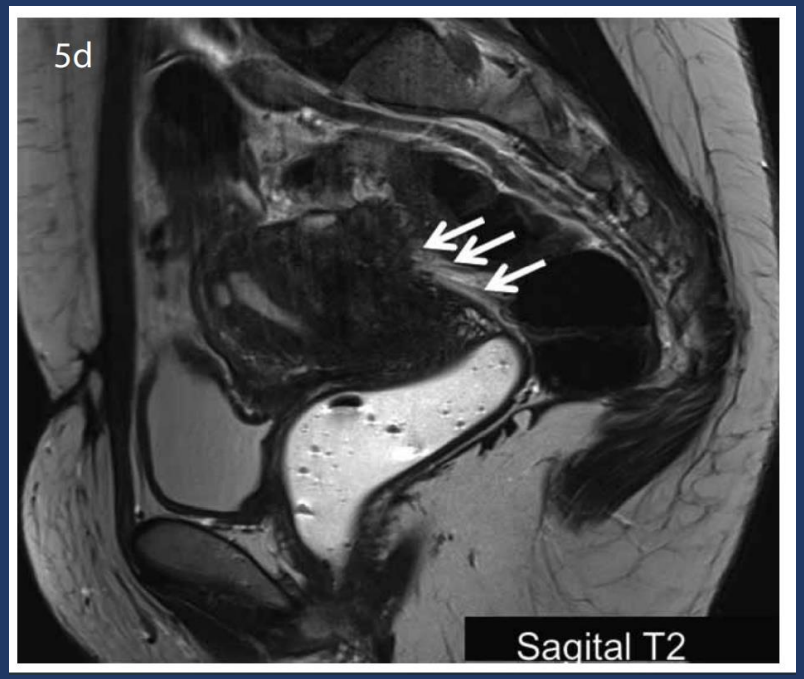
T1 contrast

- **T1**: variable due to varying protein content
- **T2:** often hyperintense, with characteristic amorphous shading
- **T1 C+ (Gd):** thick rim enhancement
- **DWI/ADC**: restricted diffusion in the fallopian tube

Posterior compartment

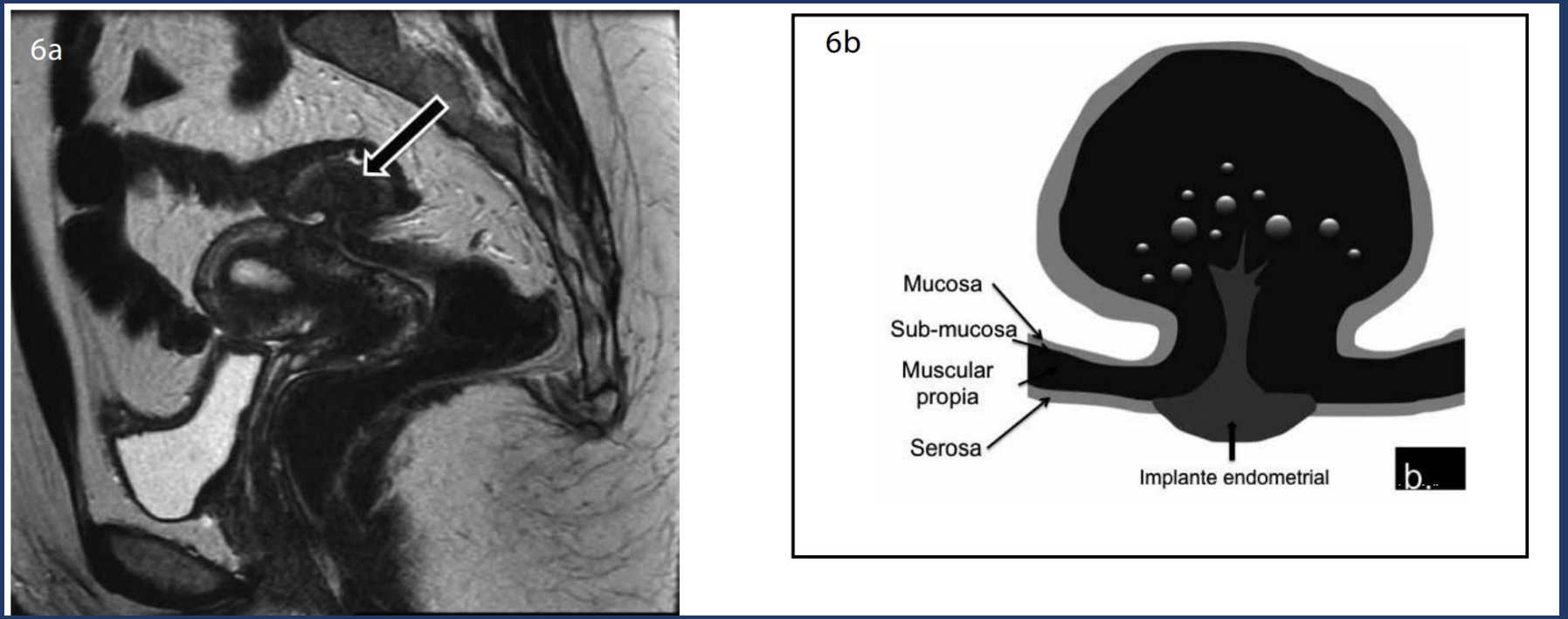
- Virtual space located between the posterior wall of the cervix-vagina and anterior rectal wall, including the rectovaginal septum, uterosacral ligaments, uterine torus, pouch of Douglas and rectosigmoid.
- This is the most common location, the retrocervical pouch and uterine torus (junction of uterosacral ligements) being the most affected sites.
- Usually produces peritoneal adhesions and retraction of the ovaries toward the posterior-middle area locating adjacent to each other, radiological sign known as “kissing ovaries”.

kissing ovaries



- The gastrointestinal tract may be compromised in 12- 37% of patients with endometriosis.
- It most commonly affects segments are the sigmoid colon, appendix, cecum and distal ileum.
- Implants are usually located on the serosal surface, but may eventually erode the subserosal layes and cause marked thickening and fibrosis of the muscularis propria until finally invading the mucosa.
- The invasion of the sigmoid colon or rectum can cause rectal catamenial and changes in bowel habits. In cases of rectal invasion, these can adopt a morphology described in literature as a “mushroom cap sign”.

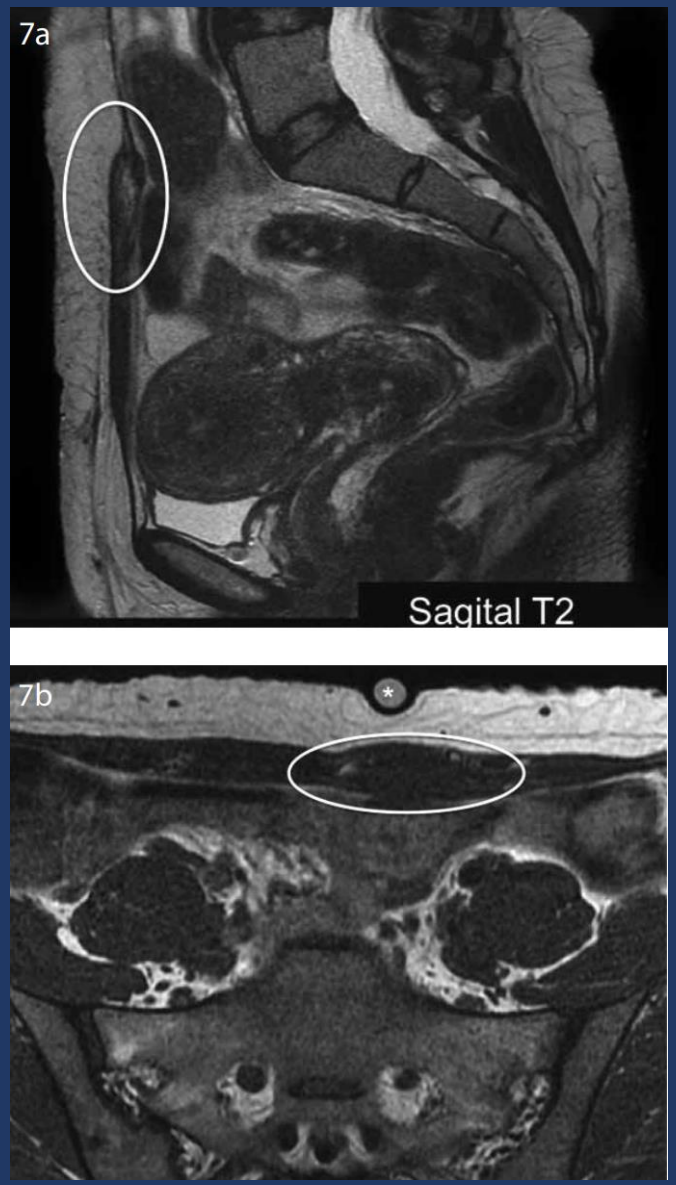
mushroom cap sign



DD: Polyp and malignant mass

Extraperitoneal Endometriosis

- The abdominal wall is the most common site of extraperitoneal endometriosis.
- The majority of implants are located near scars of previous cesarean sections. These implants can be located at muscle level, subcutaneous or both.
- MR characteristics are variable but the majority are iso- or hypointense on T1 and T2.



- Thank you for attention