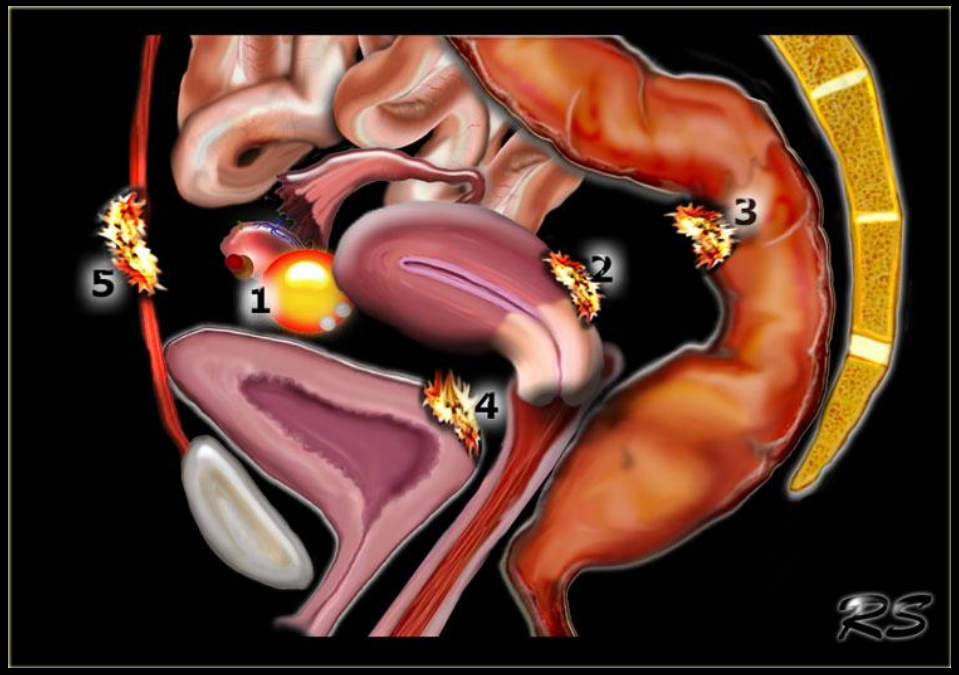
Endometriosis

- Laparoscopy is the gold standard for the diagnosis of pelvic endometriosis.
- MRI is helpful in determining the extent of deep infiltrating endometriosis, especially when laparoscopic inspection is limited by adhesions.
- Endometrial tissue outside the uterine cavity.
- Mainly found in the abdominal cavity, most commonly on the surface of the ovaries.
- It is an estrogen-dependent disease and is
- 10% of the female population, almost exclusively in women of reproductive age.

Endometriosis

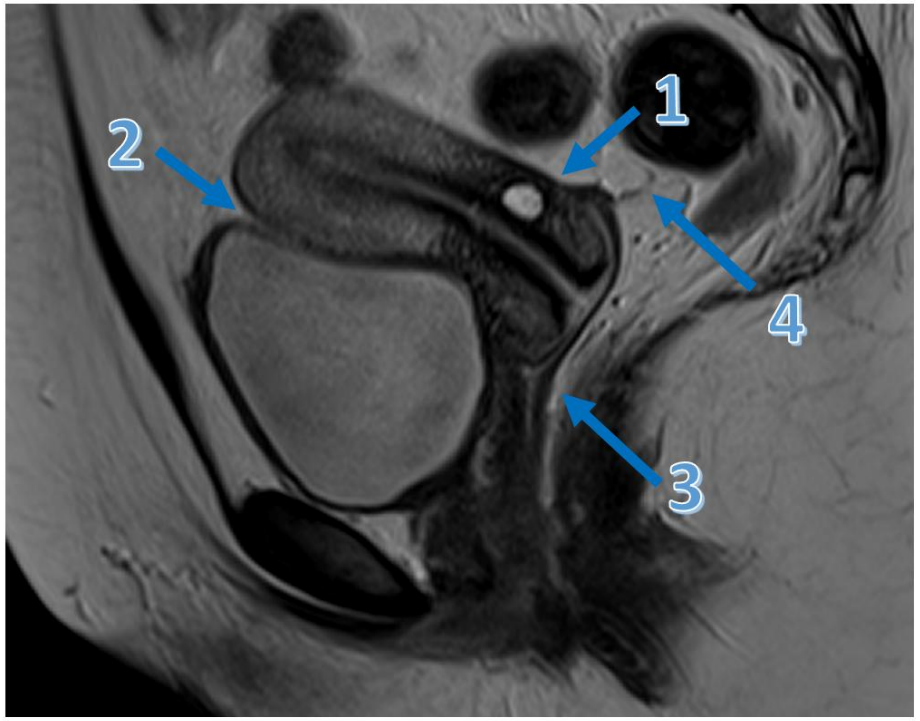


1. Ovarian endometrioma
2. Retrocervical endometriosis
3. Deep bowel endometriosis
4. Bladder endometriosis
5. Abdominal wall endometriosis

- Common symptoms
  - Dysmenorrhea
  - Dyspareunia
  - Pelvic pain
  - Infertility
  - May be asymptomatic.

Common sites of endometriosis

1. Torus Uterinus
2. Vesico-uterine pouch (anterior cul-de-sac)
3. Pouch of Douglas (posterior cul-de-sac)
4. Uterosacral ligaments



MRI

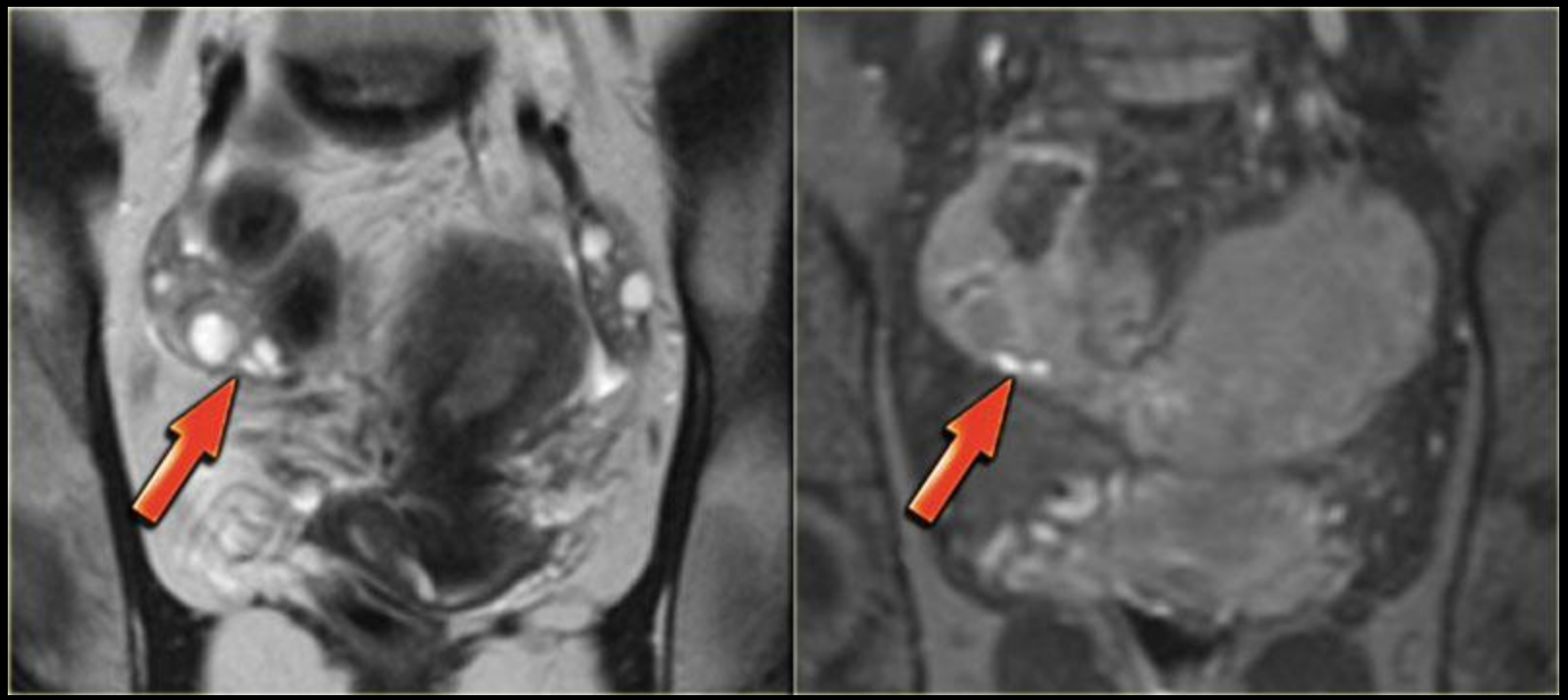
- Most low to intermediate on T2- and T1
- Foci of high signal intensity are seen on T2-weighted imaging,
  - indicating dilated endometrial glands.
- Foci of high signal intensity may be seen on T1-weighted images.
- If foci also have a high signal intensity on T1-weighted images with fat saturation, it indicates the presence of hemorrhage.
- T1-weighted images with fat saturation
  - Necessary to differentiate blood in endometriomas from fat in mature cystic teratomas, since both show high signal intensity on T1-weighted images without fatsat.

MRI

- Lesions are most often not visible because they are tiny and flat, and therefore undetectable.
- Only 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 (figure).
- Neither transvaginal ultrasound nor MRI are sufficiently sensitive to screen for these endometriotic plaques

MRI

- Coronal T2 and T1-Fatsat images:
- Superficial serosal implants of endometriosis

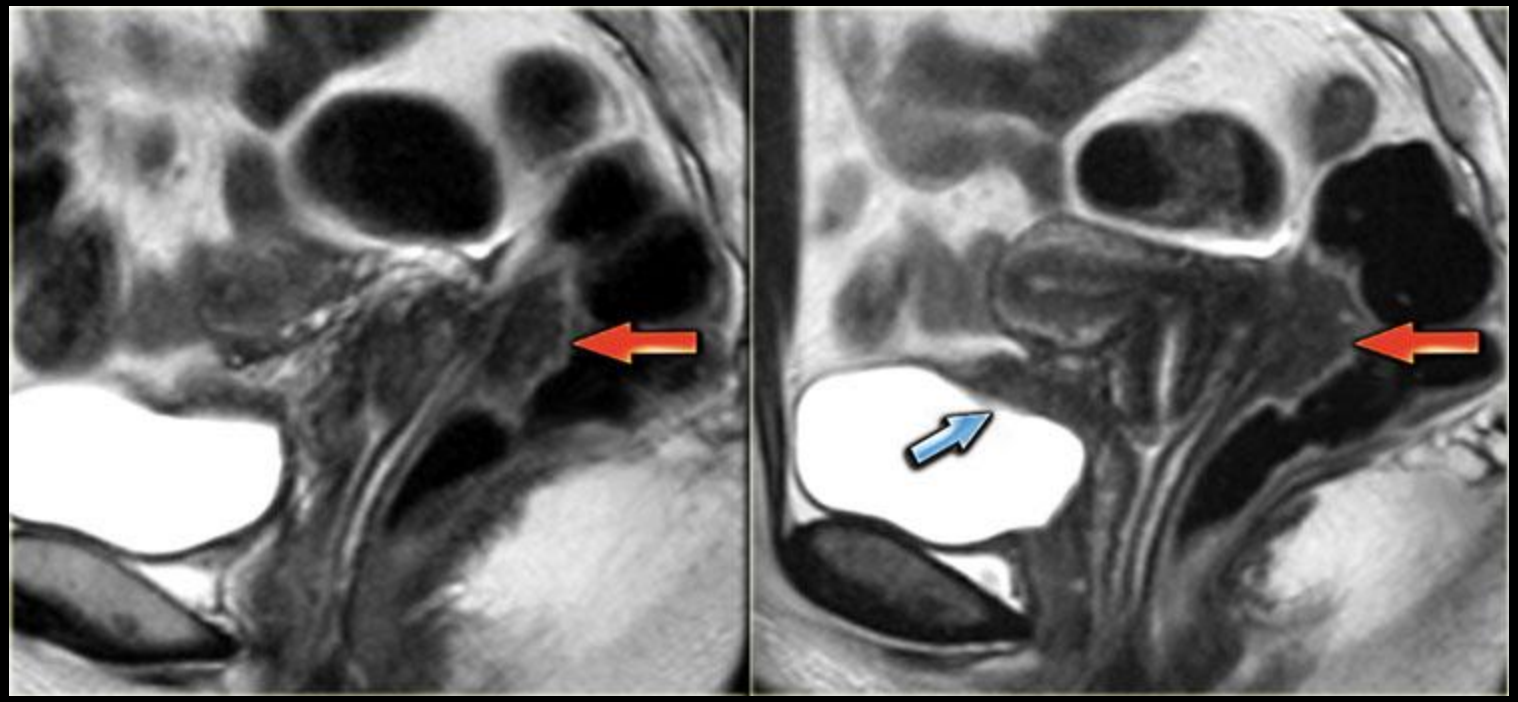


Deep pelvic endometriosis (Cullen's syndrome)

- Subperitoneal infiltration of endometrial deposits.
- Symptoms are more severe and related to the localization and depth of invasion.
- MRI is of use for the diagnosis of deep infiltrating endometriotic lesions and for the assessment of disease extension.
- Preoperative mapping of disease extension is important to decide whether surgical intervention is indicated, and if so, for planning complete surgical excision.

Deep pelvic endometriosis (Cullen's syndrome)

- Sagittal T2-weighted images demonstrating endometriosis infiltrating the rectum and endometriosis infiltrating the bladder

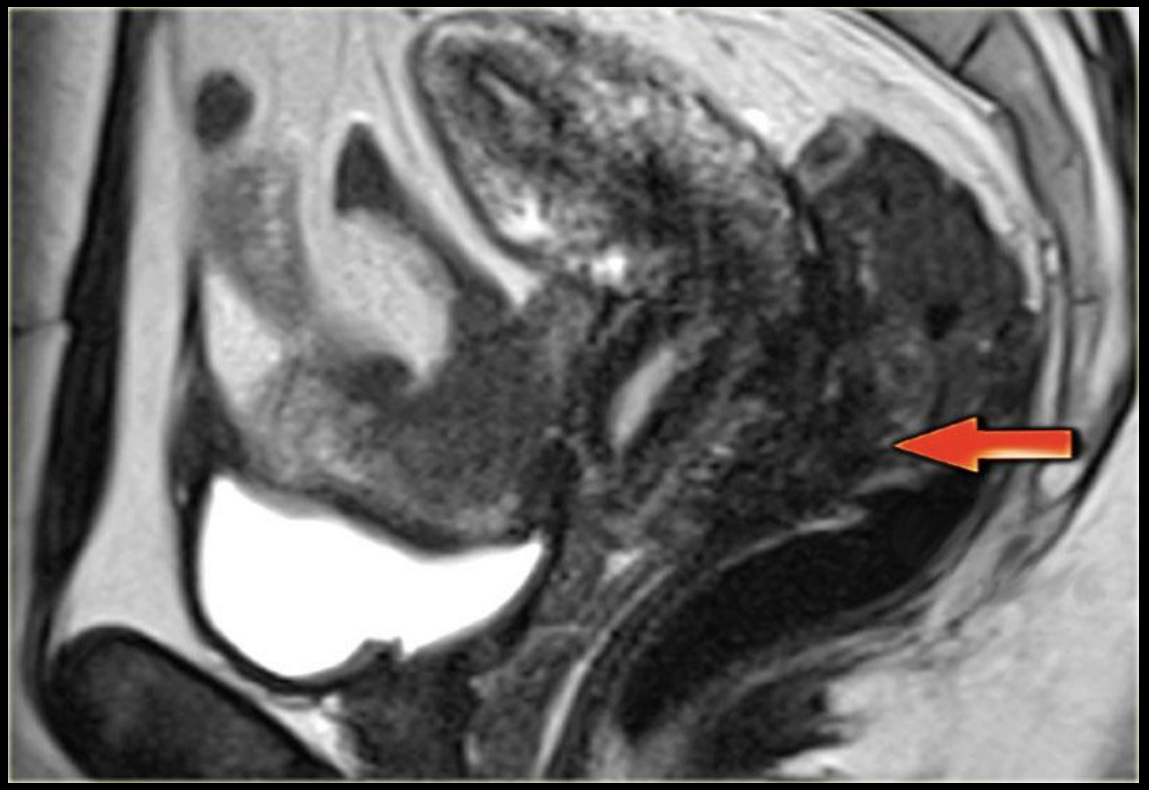


Cul-de-sac localization

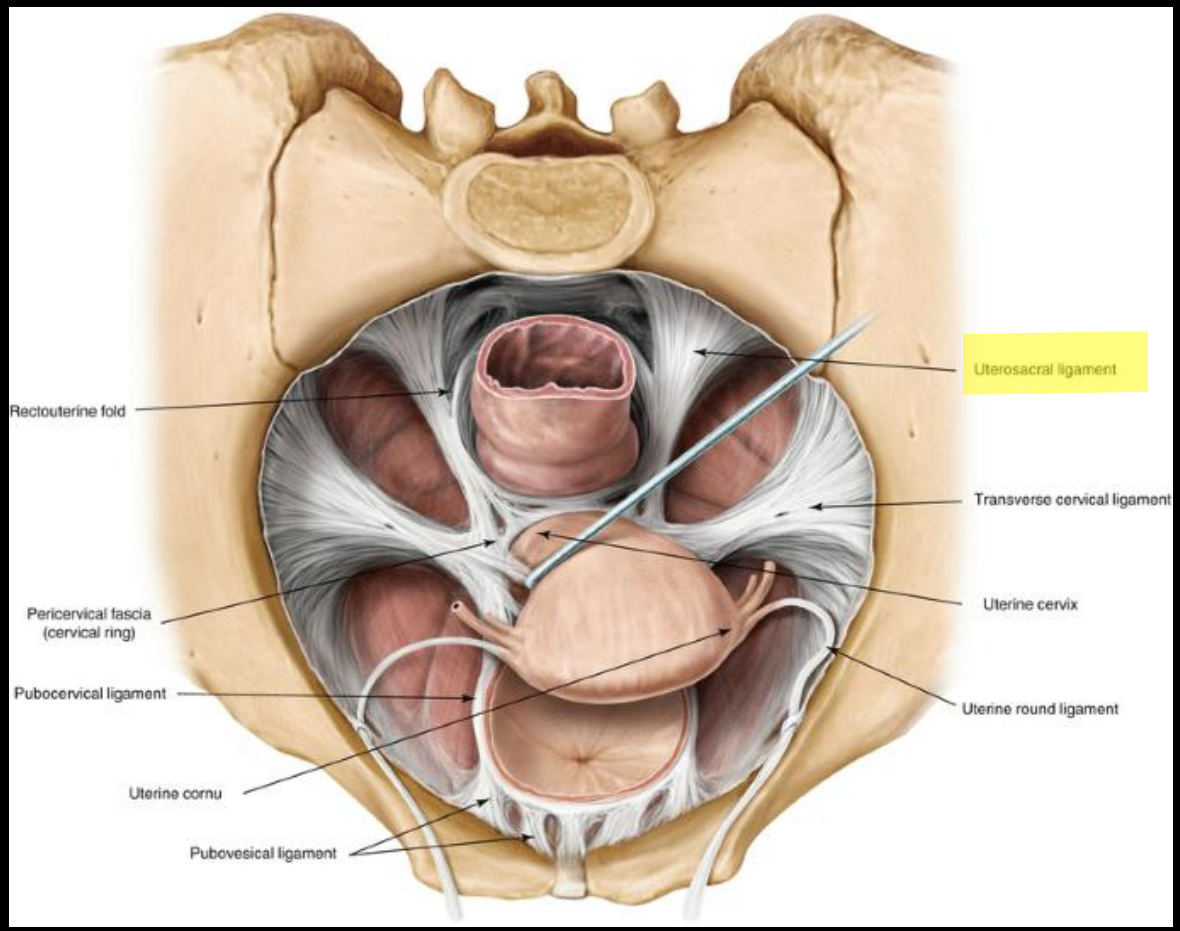
- Cul-de-sac localization and Infiltration of the rectal wall
- Most common site of pelvic involvement.
- Presence of deep infiltrating endometriosis in the cul-de-sac
  - Can be easily overlooked at laparoscopy due to the creation of a false peritoneal floor by endometriosis in the pouch of Douglas,
  - Partly caused by anterior rectal wall adhesions.
  - Phenomenon gives an erroneous impression of extraperitoneal orgin.
- Consequently, the location of the deep infiltrating endometriosis in the rectovaginal septum may also be a misnomer
  - As the rectovaginal septum is located caudal to the posterior vaginal fornix and, on the basis of normal anatomy, may therefore not be a primary site for endometriosis to develop.
- This differentiation between normal anatomy and the presence of endometriosis in the cul-de-sac is readily made using MRI.

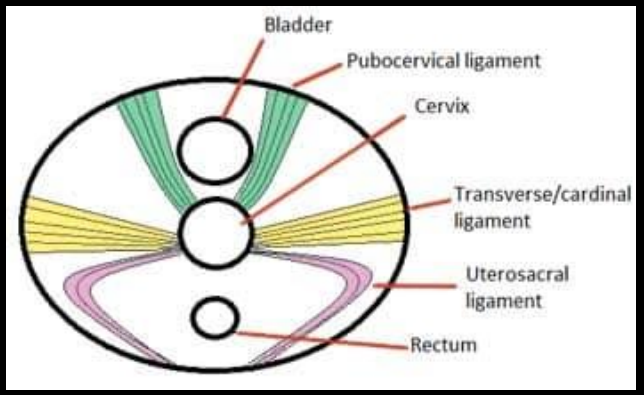
Deep infiltrating endometriosis in the posterior cul-de-sac with

- Endometriosis in the posterior cul-de-sac with infiltration of the rectal wall



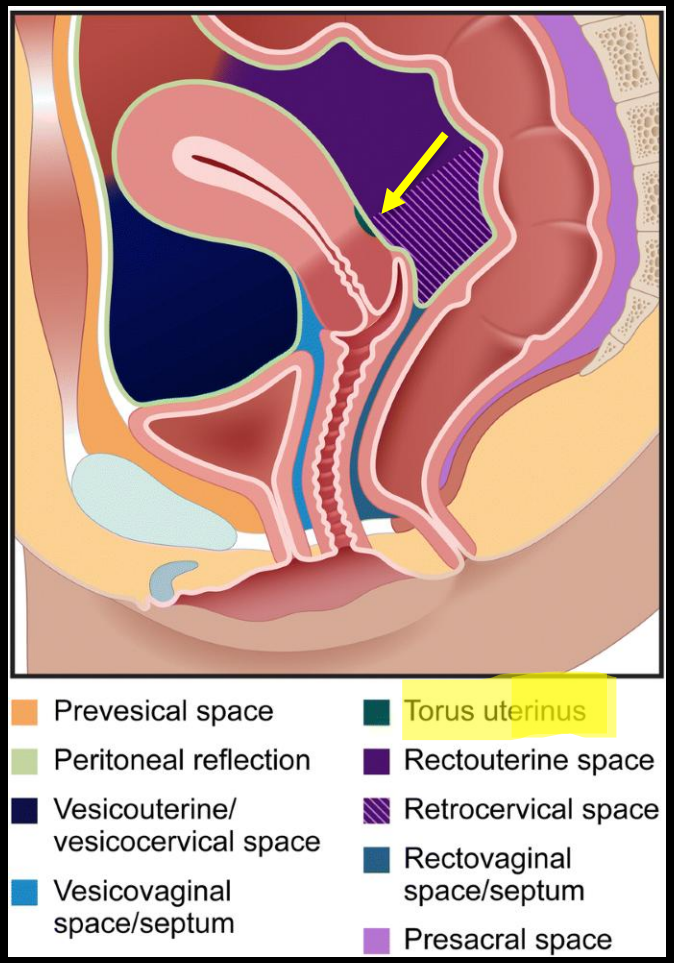
Ligaments


Uterosacral ligament
Rectouterine fold
Transverse cervical ligament
Pericervical fascia
(cervical ring)
Uterine cervix
Pubocervical ligament
Uterine round ligament
Uterine cornu
Pubovesical ligament


Bladder
Pubocervical ligament
Cervix
Transverse/cardinal
ligament
Uterosacral
ligament
Rectum

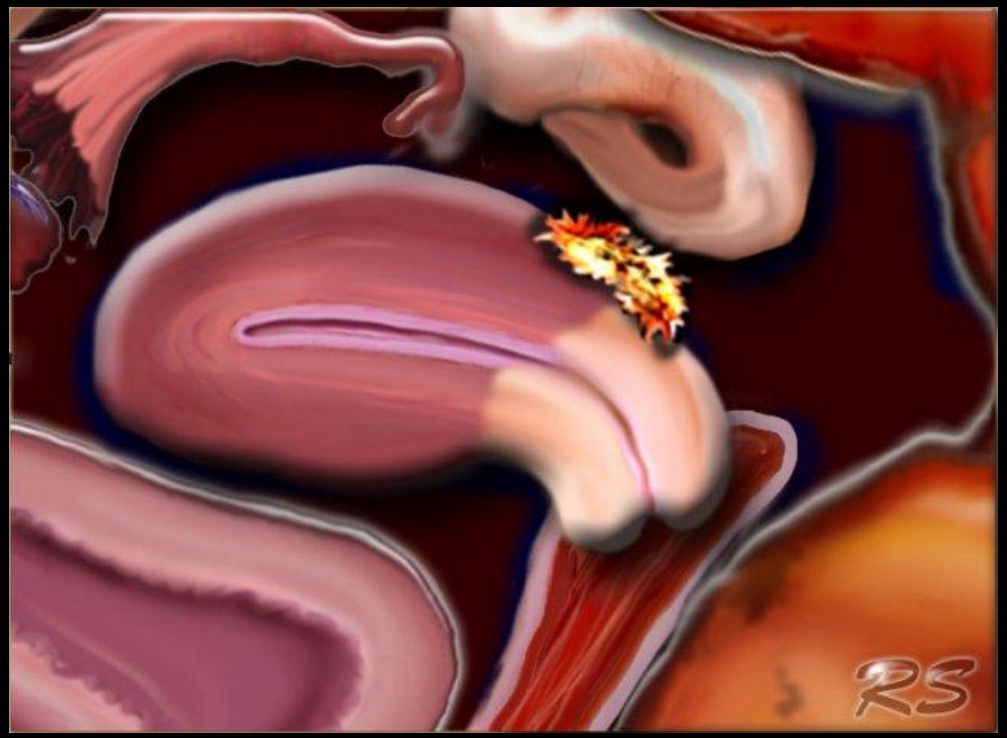
Torus uterinus

- Small, firm, transverse ridge on the posterior surface of the cervix, marking the attachment point of the uterosacral ligaments.
- It is a critical, common site for deep infiltrating endometriosis (DIE),
- Often presenting with nodules that can cause significant pain, including severe dyspareunia (painful intercourse) and pelvic pain.

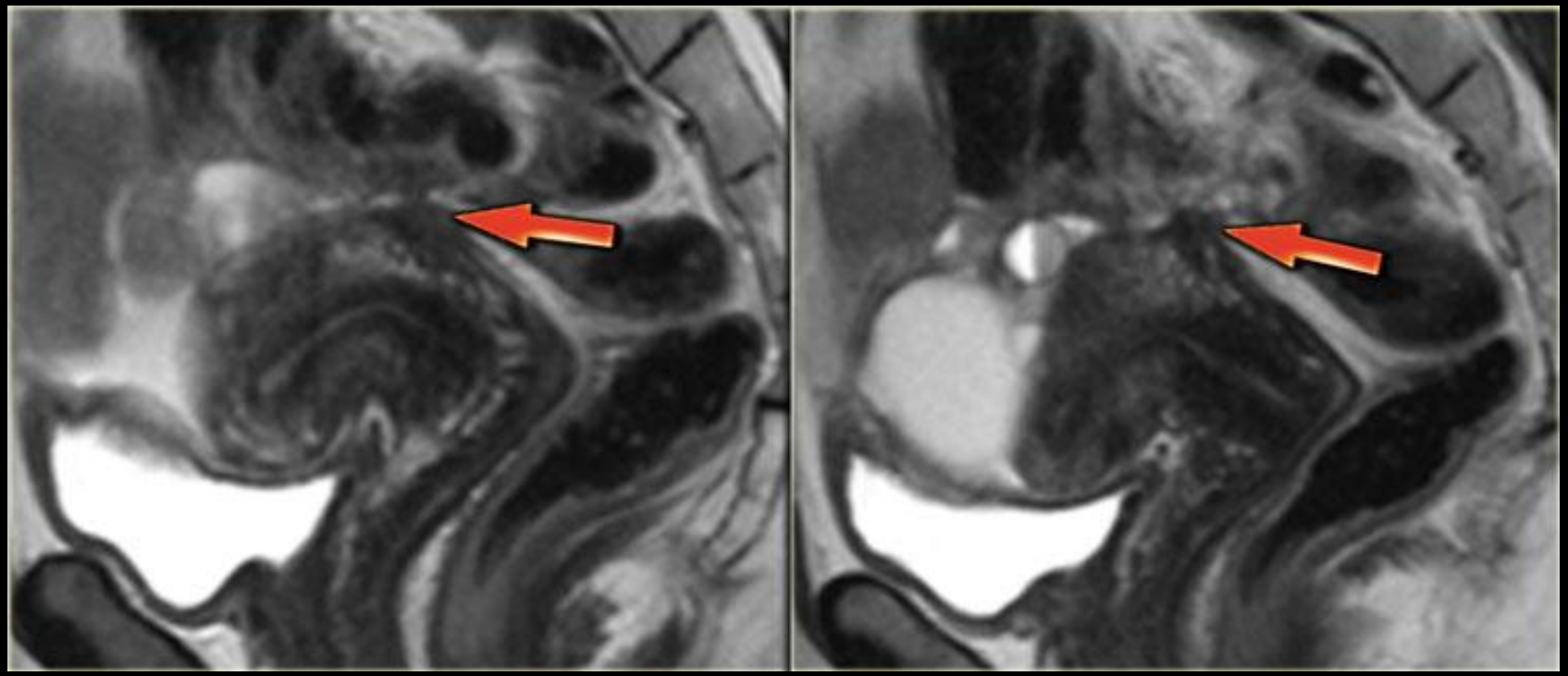


Uterus

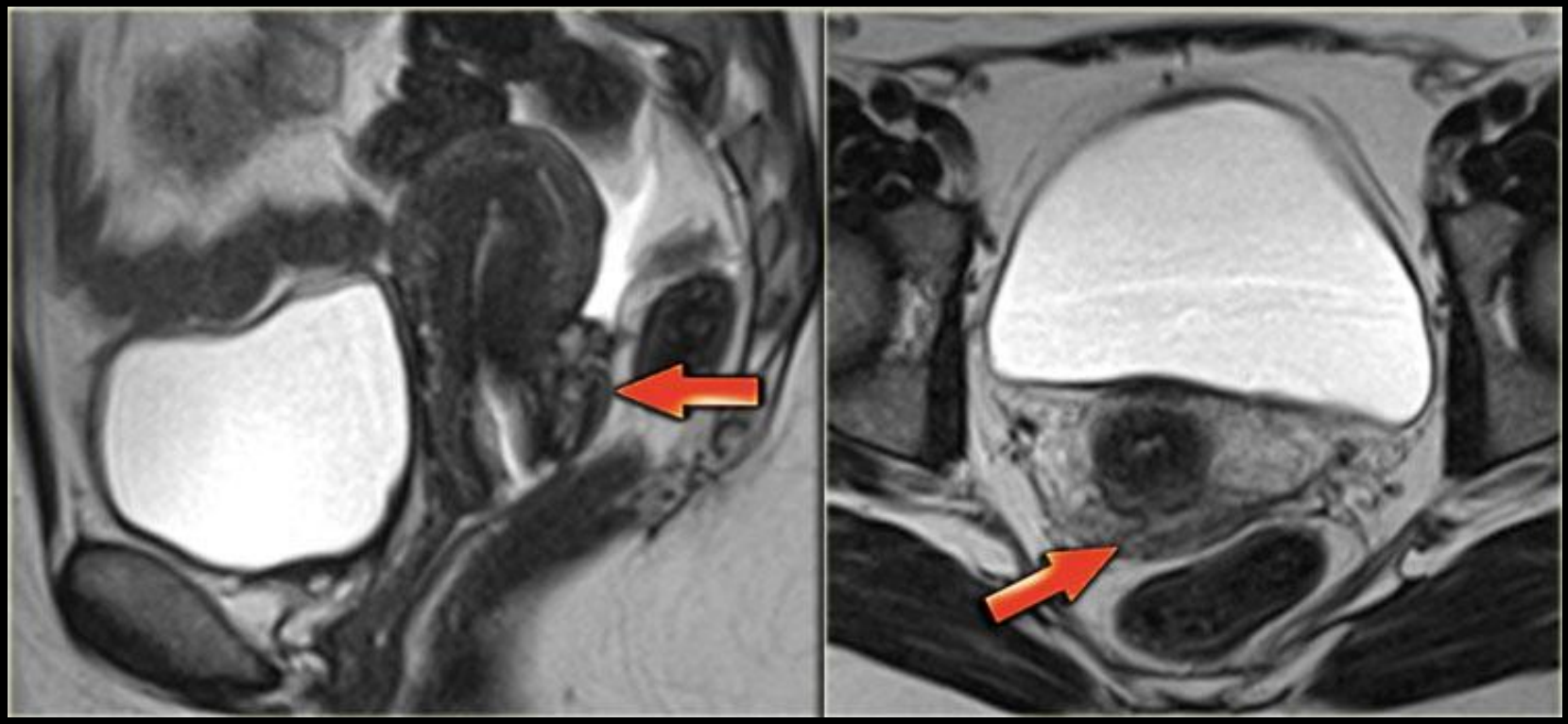
- Torus uterinus - where the sacrouterine ligaments attach - and posterior fornix are common localizations of endometriosis.
- Clinically these patients often present with dyspareunia.



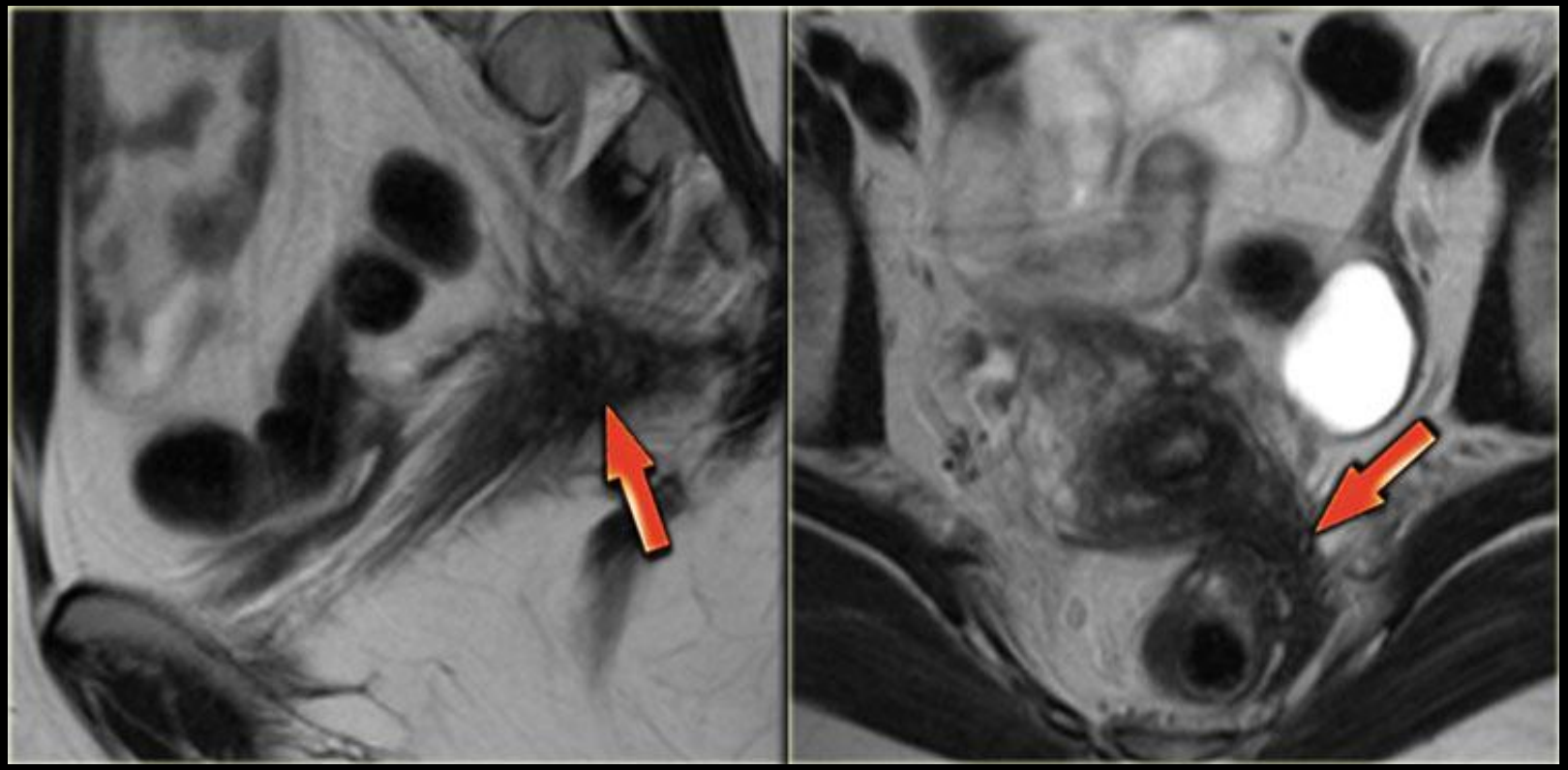
T2-images of endometriosis involving the torus uterinus.



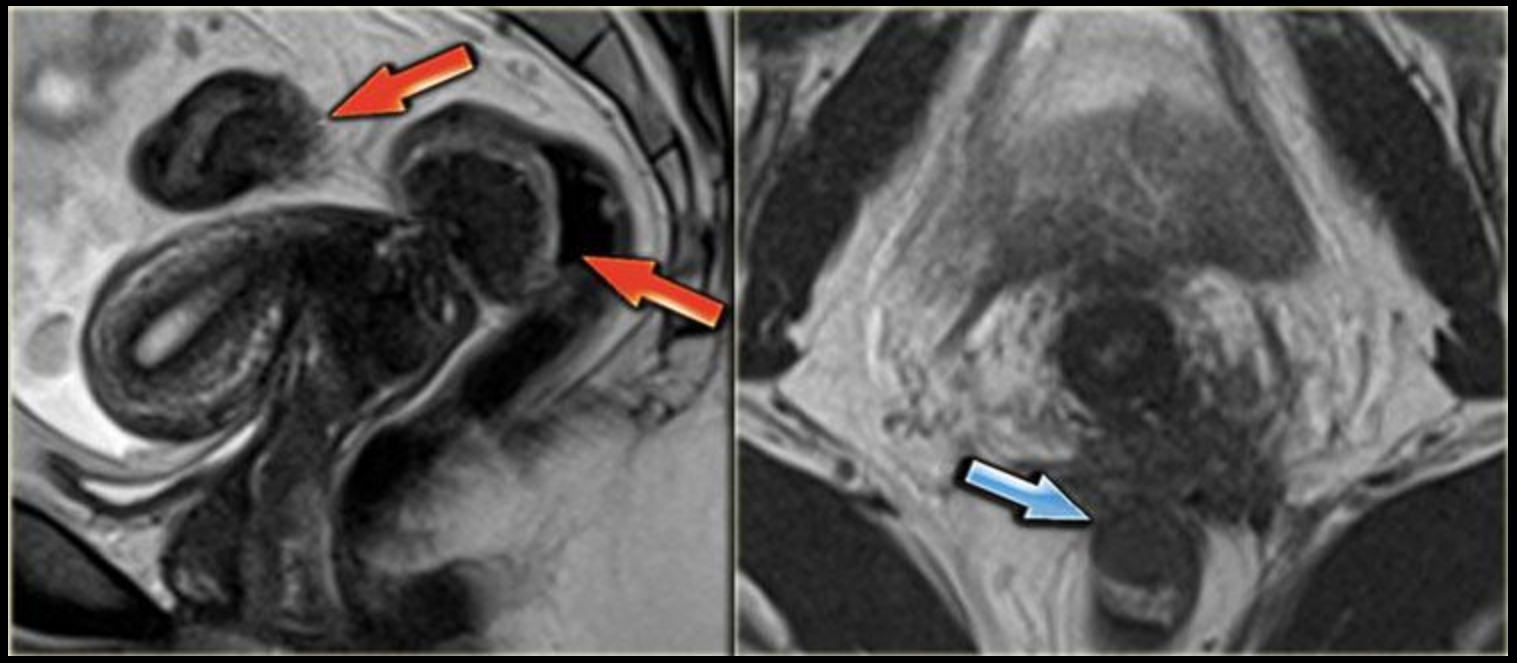
T2-images showing deep infiltrating endometriosis in the posterior fornix and torus uterinus.



T2-weighted images demonstrating involvement of the left sacrouterine ligament.



Bowel involvement

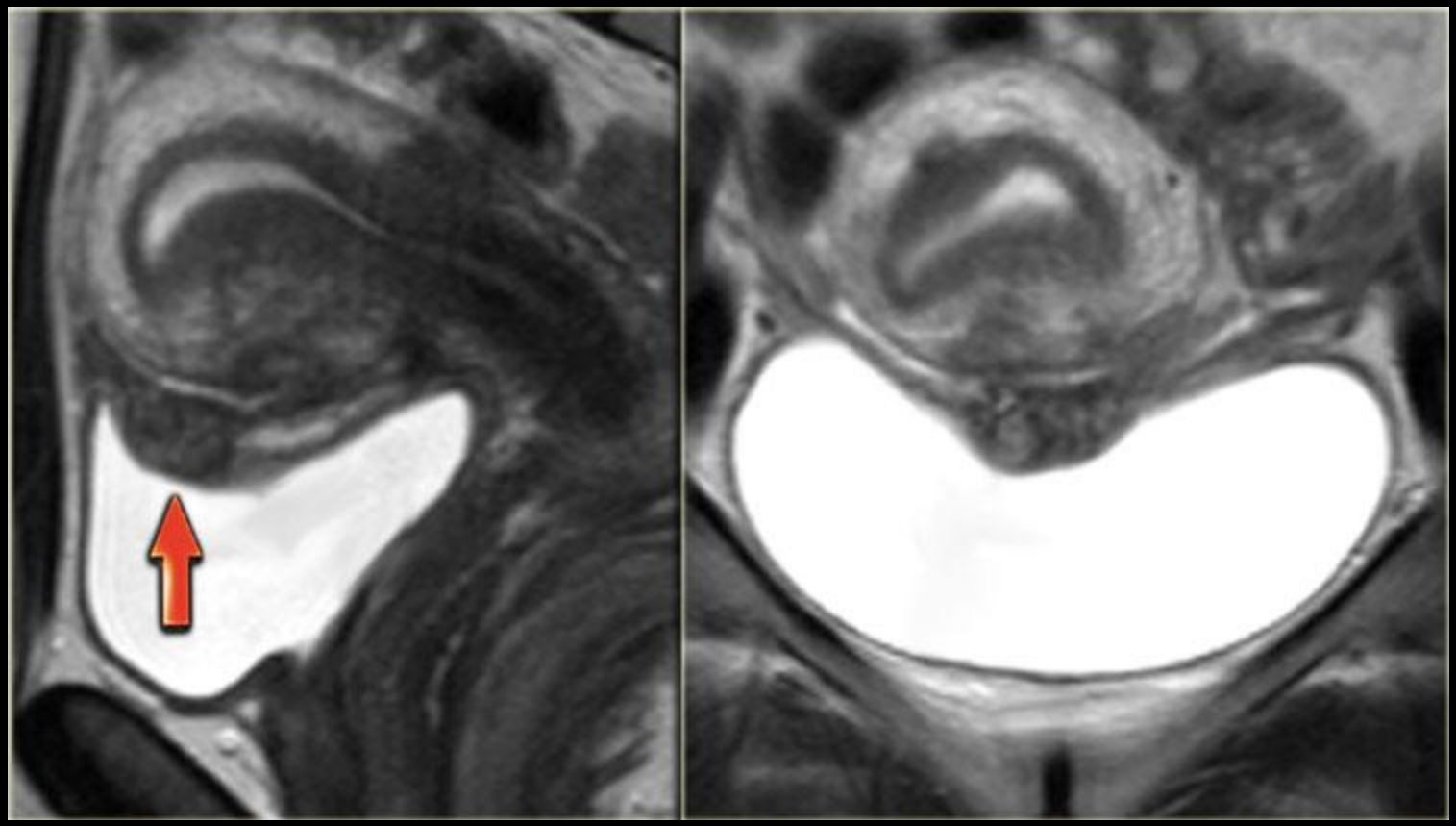


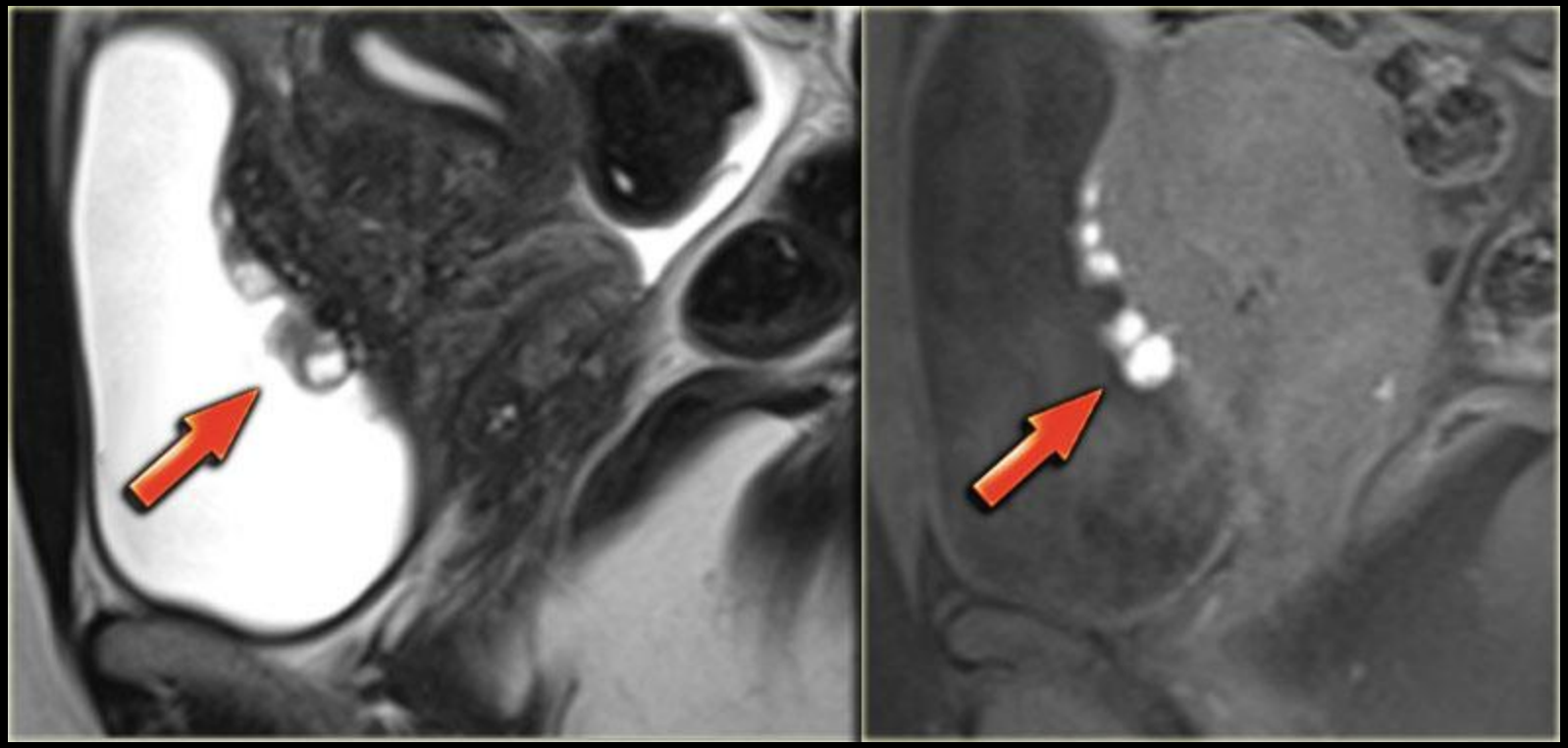
- Affects between 4% and 37% of women with endometriosis.
  Transvaginal ultrasonography is the first line
- MRI can determine the depth of bowel wall infiltration, the length of the affected area and the distance of the lesion from the anus.
- T2-images demonstrate two fan-shaped hypointense lesions (red arrows).

- Findings are typical for endometriotic lesions infiltrating the muscular layer of the bowel wall.
- Also some submucosal swelling, seen as hyperintensity on the luminal side of the bowel wall.

Rectal stenosis due to endometriosis

Bladder wall endometriosis

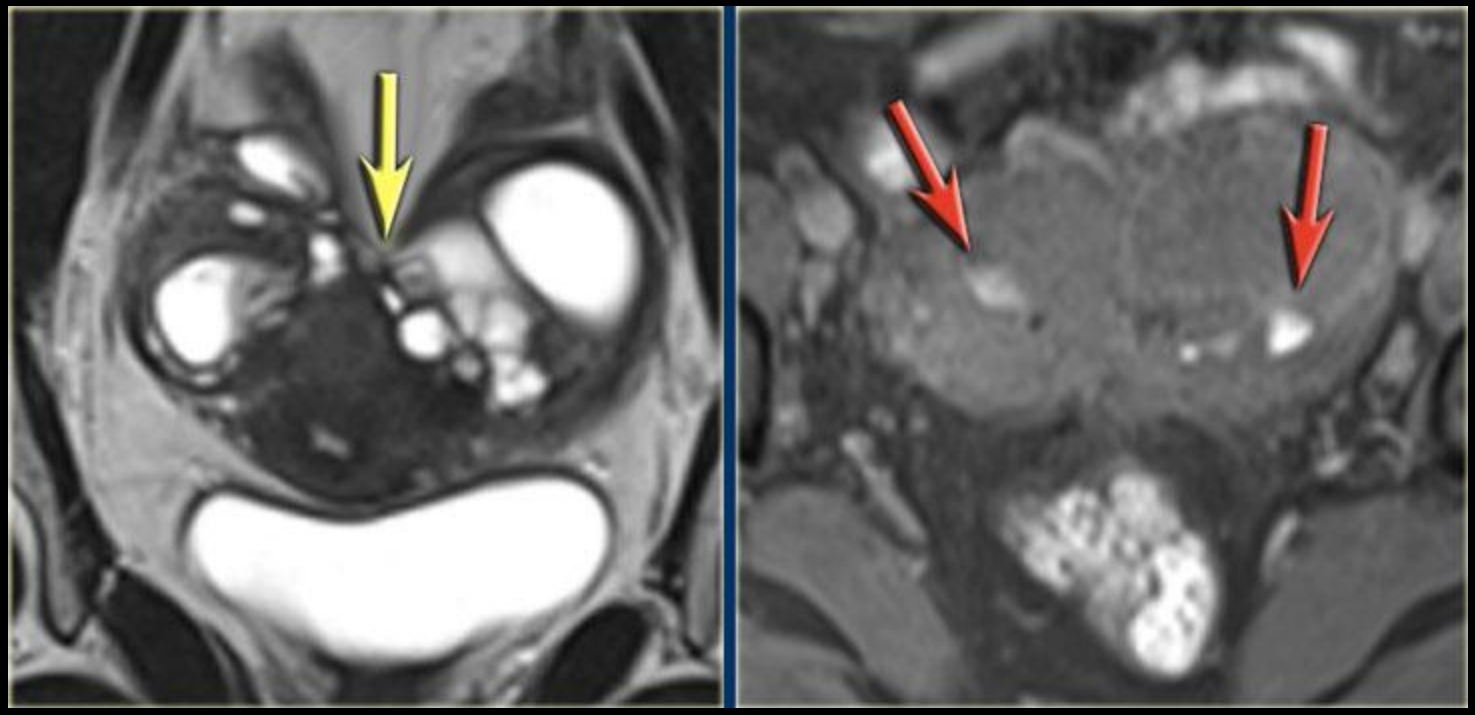




- Sagittal T2-image shows full-thickness bladder endometriosis with isointense signal compared to muscle and foci of high signal intensity, indicating dilated endometrial glands.
- Fatsat T1-image shows small cysts with hyperintense signal within the lesion caused by hemorrhage.

Adhesions

- Frequently complicated by adhesion.
- On MRI adhesions can be seen as spiculated, low- to intermediate signal intensity strandings on T1 and T2.
- Adhesions can fixate the pelvic organs, leading to posterior displacement of uterus and ovaries, elevation of the posterior vaginal fornix and angulation of bowel loops.
- They may also lead to hydronephrosis, although in most cases hydronephrosis is caused by fibrosis secondary to the endometriosis.



- The T2- and fatsat T1-images on the left show a patient with endometriosis in whom the ovaries are stuck together ('kissing ovaries'), as a result of extensive adhesion formation.
- In this patient a small hemorrhagic cyst of the left ovary and a hemorrhagic superficial plaque are also shown (high signal on T1 red arrows)
- Coronal T2WI: kissing ovaries due to adhesions RIGHT: Coronal T1WI+FS demonstrating small hemorrhages (red arrows)

Endometriosis complicated by hydronephrosis