Endometriosis

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Objectives
- Briefly describe endometriosis, pathophysiology and clinical presentation
- Ultrasound imaging of endometriosis – basic approach, challenges and some pearls
- Common and uncommon imaging findings in endometriosis with a case based approach and briefly about alternate imaging modalities

Benign estrogen-dependent condition with ectopic endometrial glands and stroma outside the uterine cavity and walls

Prevalence 10-15% in reproductive age population

30% of women with chronic pelvic pain

Pathogenesis

Retrograde menstruation
Sampson postulated that endometrial fragments transported through fallopian tubes at time of menstruation and implant at intra abdominal sites

Retrograde menstruation is essentially universal, hence neither sufficient nor compulsory
Possibly host factors such as inability to get rid of menstrual debris, Genetic differences and Medical and psychological comorbidities

Müllerian/Coelomic metaplasia
Meyer - Metaplastic transformation of pelvic peritoneum

Lymphatic spread
Halban - Substances released/shed from endometrium induce endometriosis
Iron-induced oxidative stress
Stem cells
6 key processes of development:
Migration
Adhesion
Invasion
Recruiting
Angiogenesis
Proliferation
Chronic, Inflammatory Reaction
Microscopic Internal Bleeding
Painful Endometriomas
Fibrotic Scarring/Adhesions And Distortion Of Pelvic Anatomy

Three forms of pelvic endometriosis:
Superficial peritoneal lesions, or noninvasive implants - well recognized at laparoscopy; described as black, white, or red, depending on the degree of fibrosis, scarring, and hemorrhage within the lesion. Small non hemorrhagic foci of superficial endometriosis are often not detectable with imaging.
Ovarian endometriomas.
The third form is deep (or solid infiltrating) pelvic endometriosis, which is defined by the invasion of endometrial glands and stroma at least 5 mm beneath the peritoneal surface.

Of the three forms, deep pelvic endometriosis is thought to contribute most often to female pelvic pain and infertility, the two major manifestations of endometriosis. This is also the most challenging to diagnose on US.

Sites of Involvement
- Ovary (most common)
- Cul-de-sac
- Uterosacral ligaments
- Broad ligament
- Fallopian tubes
- Round ligaments
- Vagina
- Rectosigmoid and bowel, appendix
- Urinary bladder and ureters
- Rarely diaphragms and lungs (catamenial pneumothorax)

3 D's: Dysmenorrhea, Dyspareunia, Dyschezia
- Bowel obstruction
- Melena
- Hematuria
- Dysuria
- Dyspnea
- Swelling in soft tissues
Degree of disease present has no correlation with severity of pain or symptomatic impairment

Ectopic pregnancy, pelvic infection, and ovarian torsion may mimic symptoms

Transvaginal sonography (TVS) is the first-line imaging technique for endometriosis
Every pelvic sonogram should start with a good transabdominal sonography using a wide-band 2–4 MHz transducer
To get the lay of land
Sometimes ovaries are too high to be reached with TV and you miss the chance of assessing these trans abdominally once patient evacuates the bladder
Similarly large pelvic mass will be inadequately assessed by TVUS
To look for other causes of pelvic pain such as appendicitis, diverticulitis, epiploica appendagitis etc.
And finally, to look at UR itself!
Patient may not be not sexually active or not able to tolerate TV (TRUS may be indicated in these)
TRUS can also be considered if rectal wall depth or distance of lower limit of involvement from anal canal is needed for surgical planning
Typical endometrioma

Swirl sign

D/D Corpus luteal cyst

Hemorrhagic Cyst

Normal Rectovaginal septum and posterior vaginal fornix

Assessment of rectosigmoid
Scar Endometrioma

Endometrioma left rectus abdominis

Case courtesy of Dr. S. Thipphavong, UHN
2.5% of women with endometriosis develop ovarian cancer – Clear cell or endometroid.

Malignancy uncommon in endometriomas < 6 cm, mostly in endometriomas > 9 cm

Women with endometriosis-associated ovarian cancer have a better prognosis than woman with ovarian cancer but no endometriosis, because women in the former group tend to develop lower grade tumors that manifest at an earlier stage.

Endometriosis is one of several benign causes of an abnormal CA-125 level thus, an elevated biomarker value in isolation is not specific for endometriosis-associated ovarian cancer.

In contrast, the human epididymal secretory protein E4 level is elevated in women with either endometriosis-associated or conventional ovarian cancer, but not in women with benign endometriosis.
50 year old woman experiencing severe pelvic pain, dyspareunia since 2011. History of total colectomy and end ileostomy for Ulcerative Colitis. Continued severe crampy pelvic pain. Gastroenterologist has now asked for CTE to look for small bowel IBD, stricture or obstruction. Adenomyosis and endometriosis could contribute to this woman's symptoms. Gynecological consultation for medical therapy would be worthwhile, even though she is perimenopausal. A Mirena IUD could also be considered.

40 year old woman presented to ER with flank pain and ARF. False positives: Corpus luteal/hemorrhagic cyst, Ovarian cystic neoplasms, PID with hydro/pyosalpinx, Solid ovarian hypoechoic masses such as fibroma, Pedunculated/ broad ligament fibroid, Pelvic adhesions. False negative: Usually deep pelvic/pelvic side wall (Low sensitivity for vagina and recto vaginal septum and uterosacral ligaments, Peritoneal/omental disease, Small bowel involvement, Abdominal wall if no palpable abnormality reported by patient or clinician.
Endometriosis can go unrecognized because of its varied imaging appearance, common mimickers as well as lack of expertise in recognizing many of its manifestations.

Typical localization of endometriosis such as inguinal canals should be included in imaging checklist.

Diligent search for deep pelvic endometriosis should be made to avoid misdiagnosis and treatment delay.

MR/CT can be very helpful in demonstrating deep pelvic endometriosis as well as some unrecognized complications.