Leiomyomas
Benign muscular tumors also known as myomas, fibromyoma, and fibroids. Occur in approximately 20% of all women in the United States and are more frequently encountered in African American women. They can occur anywhere in the uterus, cervix or broad ligament but are most commonly found in the uterine corpus. Degeneration of myomas can occur when the mass outgrows its blood supply. Description of locations include:

* PEDUNCULATED arising from a stalk

* EXOPHYTIC growing out of the uterus

* INTRAMURAL interstitial location within the myometrium

* SUBMUCOSAL lying directly beneath the endometrium and frequently projecting into the cavity

* SUBSEROUS lying close to the outer, peritoneal surface of the uterus

* INTERLIGAMENTOUS occurring within the broad ligament

CLINICAL FINDINGS

- No symptoms in most cases
- When symptoms are present they may include:
  - Heavy periods (menometrorrhagia)
  - Alteration in the normal menstrual flow
  - Pelvic pain caused by degeneration, torsion or infection
SONOGRAPHIC FINDINGS:
Specific sonographic appearance depends on the size of the fibroid and the degree and type of degeneration present. Most common sonographic findings include:
- Well circumscribed, hypoechoic masses
- Increased attenuation within the mass
- Calcifications within mass
- Distortion of normal uterine contour
- Extrinsic compression of the posterior bladder wall

**Adenomyosis**
A benign, typically diffuse disease characterized by infiltration of the endometrial glands and stroma into the myometrium. Adenomyosis is usually more extensive in the posterior wall of the myometrium. It is suspected in 40-50 year old women with dysmenorrhea and irregular bleeding.

SONOGRAPHIC FINDINGS:
- Enlarged uterus with normal contours
- Focal areas of decreased echogenicity within the myometrium, possibly with small myometrial cysts.
- Thickening of the posterior myometrium

**Nabothian Cysts**
Retention cysts most frequently found in the intramural portion of the cervix. They are the result of the blockage of an endocervical gland.

SONOGRAPHIC FINDINGS:
- Small, well-circumscribed, anechoic structure located within the cervical wall
- Posterior acoustic enhancement
**Gartner’s Duct Cysts**
Mesonephric duct remnants that form a cyst along the lateral or anterolateral wall of the vagina.

**SONOGRAPHIC FINDINGS:**
- Cystic mass lateral to vagina
- Most common cystic mass lateral to vagina
Postmenopausal Sonography

NORMAL PHYSIOLOGY
The ovary gradually becomes unresponsive to the gonadotropins as a woman ages and stops producing progesterone, estradiol and significant levels of estrogen. Menses becomes irregular and generally ceases between 45-55 years of age. The uterus and vagina gradually become atrophic.

NORMAL ANATOMY
SONOGRAPHIC FINDINGS:
- Uterine and cervical contours and proportion maintained
- Normal endometrium appears as a stripe
- Decreased estrogen levels = thinner stripe
- <= 5 mm is considered upper limit of normal by most
- Patients receiving sequential estrogen/progesterone replacement - endometrium resembles pre-menopausal cyclical endometrium

POST MENOPAUSAL VAGINAL BLEEDING
Any bleeding from the genital tract in an older woman that occurs more than 6 months after the last period. Causes include:
- Exogenous estrogen administration - most common
- Endometrial atrophy – most common without HRT
- Cervical carcinoma
- Estrogen producing functional tumor of ovary (rare)

HORMONE REPLACEMENT THERAPY
The administration of estrogen and progesterone may help relieve some of the symptoms associated with menopause. It also helps prevent severe osteoporosis and improves a patient’s cardiovascular risks. However, unopposed estrogen is associated with increased risk of hyperplasia and endometrial carcinoma. The cutoffs of normal endometrial thickness and threshold values for women on hormone replacement therapy that present with postmenopausal bleeding are not well established at the present time.
SONOGRAPHIC FINDINGS:
- Endometrial stripe up to 8mm on unopposed estrogen only
- Endometrial stripe up to 10-12 in estrogen phase - decreases during progesterone phase.
- Cyclic hormones = menstrual type endometrium
- Continuous hormones <8mm

Sagittal EV sonogram demonstrating the endometrium in a patient in estrogen cycle of on HRT

Tamoxifen is a nonsteroidal antiestrogen used as a chemotherapeutic agent in patients with certain types of breast cancer. It some patients, it may cause an increase in endometrial thickness.
Endometrial Pathology

Endometrial Carcinoma
Endometrial carcinoma is the most common type of gynecologic malignancy. 75-80% of all endometrial carcinoma occurs in postmenopausal women. There are three histologic types:

* Adenocarcinoma (most common)
* Adenoacanthoma
* Adenosquamous carcinoma

Associated risk factors include:

* Obesity
* Hypertension
* Diabetes mellitus
* Strong familial history of uterine cancer

Initially the tumor mass grows into the uterine cavity. Myometrial invasion is the first indication of continued spread of the disease. Without treatment, the malignancy may spread to the cervix, adnexa, fallopian tubes and ovaries. Distant metastases may occur if the pelvic lymphatic system is infiltrated.

Clinical Signs

- Vaginal bleeding; post-menopausal
- Hypermenorrhea, intermenstrual flow in patients still having periods
- Pain as the result of uterine distention

Sonographic Findings:

- Alteration in size, shape and sonographic texture of the uterine parenchyma
- Increased uterine size
- Inhomogeneity and thickening of endometrial echoes (>5 mm) especially in a post-menopausal woman (varies with patient's hormone status)
- Fluid in the endometrial cavity
**Endometrial Hyperplasia**
A benign condition characterized by excessive proliferation of endometrial tissue caused by unopposed estrogen stimulation. It is suspected as a precursor to endometrial carcinoma. The clinical signs produced by a hyperplastic endometrium are similar to those produced by carcinoma and a thorough histologic examination of curettage specimens is required to make a definitive diagnosis. Ideally, the sonogram should be performed at the beginning or end of the hormone cycle.

**SONOGRAPHIC FINDINGS:**
- Smoother borders
- More homogenous texture, but possibly cystic changes
- Premenopausal women, if EC >14 mm
- Postmenopausal women on estrogen only, if EC > 5mm
- Postmenopausal women in estrogen phase, EC can = up to 8mm, then in progesterone phase, EC decreases

Examples of the varying sonographic appearance of endometrial hyperplasia. Discrete cystic changes are seen in the image on the right

**Endometrial Polyps**
Sessile or pedunculated projections of the endometrium. The etiology is similar to that of endometrial hyperplasia.

**CLINICAL SIGNS:**
- Usually asymptomatic
- Infertility
- Abnormal uterine bleeding
- Usually discovered incidentally during D & C
- Occasionally causes post menopausal bleeding
SONOGRAPHIC FINDINGS:
- Non-specific thickened endometrium, usually focal but occasionally diffuse
- Discrete mass in the endometrium possibly with vascular stalk demonstrated with color Doppler
- May be indistinguishable from endometrial hyperplasia
- Sonohysterogram is ideal for demonstrating polyp size and location

Examples of the varying sonographic appearance of endometrial polyps. Differentiation between polyps and endometrial hyperplasia is frequently not possible on the basis on sonography alone.

Fundal polyp seen projecting from fundal endometrium. In the gross specimen on the left. Sonohysterogram on the right outlines polyp.