Normal Uterine Anatomy and Histology in the Non-pregnant and Pregnant Patient

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Disclosures

• None
Uterus

- Nulliparous: 6-8 cm in length
- Multiparous: 9-10 cm in length
- Consists of the main body (corpus), with a superior fundus
- Constriction of the body occurs superior to the cervix (isthmus of uterus)
Uterus: Relationship to Pelvic Organs

Relationship of Bladder to Uterus
Uterine Peritoneal Reflections

Uterus covered by reflection of the pelvic peritoneum (lining of the abdominal cavity)

- Reflection continues laterally to form the **broad ligament**.
- Broad ligament houses the major uterine vessels and the fallopian tubes at their apices.
Following menopause, uterus shrinks, often to nulliparous size.
Uterine Fundus Levels During Pregnancy

Image from Pelvic and Retroperitoneal Space; Sobotta Atlas of Human Anatomy, Vol. 2, Paulsen, F Ed. Pg 157-240, Fig 7.81, © 2013
Uterus With Placenta and Fetus (near term)
Major Vessels of the Pelvis

- Vena Cava
- Aorta
- Common iliac artery
- Internal iliac artery

Uterine Arterial Supply

**Uterine artery:** branch from internal iliac artery

**Ovarian artery:** direct branch from aorta

Dual arterial supply to uterus from anastomoses between these two systems
Uterine veins accompany their respective arteries.

Uterine veins empty into internal iliac vein.

Ovarian veins:
- Right: empties into vena cava
- Left: empties into left renal vein
Uterine Histology

Three major layers:
1. **Endometrium**: fibroblast stromal cells and endometrial glands
2. **Myometrium**: smooth muscle cells, vascular plexus, and lymphatics
3. **Perimetrium**: serosal connective tissue layer

Image from URL: [http://medcell.med.yale.edu/histology/female_genital_tract_uterine_cycle.php](http://medcell.med.yale.edu/histology/female_genital_tract_uterine_cycle.php), last accessed 4/1/2017
Myometrium

• Mostly smooth muscle, but also contains collagen, elastin and fibronectin.
  • Outer longitudinal muscular layer
  • Inner circular submucosal layer
  • Thick middle layer rich with vessels and random interdigitating fibers

• More smooth muscle in body, less in lower uterine segment and cervix

Images from: Female Reproductive System, in Stevens & Lowe's Human Histology. Lowe JS, Anderson PG. Pages 337-362. © 2015. FIGURE 17.10
Myometrial Growth During Pregnancy

- Estradiol drives myometrial hypertrophy and hyperplasia
- Myometrial cells have dramatic increase in number of gap junctions (to permit for coordinated uterine contractions)
- Uterine weight increase: $\sim 75\, g \rightarrow \sim 1300\, g$
- Following delivery:
  - Loss of 85% of weight in 3 weeks, mostly due to intracellular volume contraction and collagen degradation.
Myometrium

• Junctional Zone (JZ): low signal on T2-weighted MRI identifying junction between basal endometrium and myometrium.

• JZ less prominent in pre-menarche and post-menopause; poorly seen in pregnancy but reappears weeks to months post-delivery.

• More concentric myocyte arrangement (outer is more longitudinal)

Myometrial smooth muscle compress blood vessels when contracted.
Uterine Corpus Endometrial Histology

Two layers:

1. **Basalis**
   - Irregular junction with myometrium, interdigitated with smooth muscle and endometrial stroma
   - “Reserve cell layer” of the endometrium
   - Few changes with menstrual cycle

2. **Functionalis**
   - Contains distal endometrial glands
   - Significant changes with menstrual cycle

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**Proliferative Endometrium**

**Glands:** small, straight

**Stromal cells:** small, scant cytoplasm
  - Late proliferative: increased intra- and extracellular collagen

Image from URL:
[https://librepathology.org/wiki/Proliferative_phase_endometrium](https://librepathology.org/wiki/Proliferative_phase_endometrium),
last accessed 4/1/2017
Secretory Endometrium

Glands: Coiled, serrated

Stromal cells: “Predecidualization”—small sheets of polygonal cells with distinct cells borders due to increased pericellular matrix

Increased stromal edema

Image from URL:
https://librepathology.org/wiki/Secretory_phase_endometrium last accessed 4/1/2017
Decidualized Endometrium

- **Decidua**: specialized endometrial stroma of pregnancy

- Secretes products involved with paracrine and autocrine regulation of feto-maternal interface.

- Decidual cells are capable of phagocytosis and play role in collagen scaffold breakdown at implantation site.

Image from URL:
http://library.med.utah.edu/WebPath/PLACHTML/PLAC094.html
Last accessed 4/1/2017
Microvascular Supply of Endometrium

Uterine and ovarian arteries give rise to arcuate arteries.

Arcuate arteries branch into radial, straight and spiral arteries, which supply endometrium.

Source: The Female Reproductive System, Junqueira’s Basic Histology, 14e
Citation: Mescher AL. Junqueira’s Basic Histology, 14e; 2016
With loss of endometrial layer, fluid within the uterine cavity can enter the uterine venous system.

Uterine intrinsic veins do not contain valves;¹ loss of endometrial layer also causes venous blood loss.

Questions?