Objectives

- Bony pelvis and pelvic joints
- Pelvic openings
- Ligaments
- Pelvic spaces
- Muscles and fascia, levels of support
- Innervation and blood supply
- Bladder and ureter
Bony pelvis and pelvic joints

- Sacrum, coccyx and innominate bones
  - Ilium, ischium and pubis: fuse at acetabulum
  - Ilium articulates with the sacrum posteriorly at sacroiliac joint
    - Synovial joint, stability of the bony pelvis
  - Public bones articulate with each other anteriorly at symphysis pubis
    - Cartilaginous joint
Pelvic openings

- Obturator foramen
  - Filled with obturator membrane
  - Obturator canal with obturator neurovascular bundle to medial compartment of thigh (adduction)

- Greater and lesser sciatic foramen
  - Divided by sacrospinous and sacrotuberous ligaments
  - Greater: piriformis m., internal pudendal and inferior gluteal vv., sciatic n., and branches of sacral nerve plexus
  - Lesser: internal pudendal vv., pudendal n., and obturator internus tendon
Ligaments

- Sacrospinous, sacrotuberous and anterior longitudinal ligaments:
  - Dense connective tissue that join bony structures
  - Contribute to bony pelvis stability
Ligaments

- **Round ligament**: smooth muscle
  - Develops from gubernaculum
  - Supplied by Sampson’s artery-anastomosis of uterine a. and ovarian a.

- **Broad ligament**: loose areolar tissue
  - Meometrium
  - Mesosalpinx
  - Mesovarium

- **Infundibulopelvic ligament**: Contains ovarian vessels

- **Cardinal ligament**: Containes uterine arteries

- **Uterosacral ligaments**: Travels from uterus to anterior aspect of sacrum
Pelvic spaces

- **Space of Retzius**
  - Between bladder and anterior portion of pelvic walls

- **Vesicovaginal space**
  - Between lower urinary tract and genital tract

- **Rectovaginal space**
  - Between posterior vaginal wall and anterior surface of rectum
Pelvic wall muscles

- **Piriformis**
  - Exits pelvis through greater sciatic foramen and attaches to greater trochanter of the femur
  - External or lateral hip rotator
  - Innervation: L5, S1 and S2
  - Blood supply: inferior gluteal, lateral sacral and superior gluteal artery
  - Injury: persistent hip pain

- **Obturator internus**
  - Exits pelvis through lesser sciatic foramen and attaches to greater trochanter of femur
  - External hip rotator
  - Innervation: L5, S1 and S2
  - Blood supply: inferior gluteal artery

- **Obturator externus**
  - Adduction and lateral rotation of thigh
  - Innervation: L3 and L4
  - Blood supply: obturator artery (internal iliac a.)
Obturator externus muscle
Levator ani muscles

- Pubococcygeus
- Puborectalis
- Iliococcygeus

Resting tone keeps urogenital hiatus closed, resisting downward displacement of vagina during increased intra-abdominal pressure.

- Loss of function leads to widening of urogenital hiatus and results in pelvic organ descent

- Coccygeus
  - Triangular muscle occupies the area between ischial spine and coccyx
Pelvic floor muscles

Urogenital diaphragm
• Support urethra and maintenance of UVJ
• External urethral sphincter muscle
• Deep transverse perineal muscle
  • Innervated by branches of pudendal n.

Superficial Perineal muscles
• Bulbospongiosus muscle
  • Surrounds orifice of vagina and covers vestibular bulbs. Reduces size of vaginal orifice and compresses deep dorsal vein of clitoris to assist in clitoris erection
• Ischiocavernosus muscle
  • Covers crus of clitoris, assists with erection of clitoris
• Superficial transverse perineal muscle
Fascia

- Arcus tendineus levator ani
  - Medial surface of obturator internus muscle
- Arcus tendinous fascia pelvis
  - Medial aspects of obturator internus and levator ani muscles
  - Lateral point of attachment for anterior vaginal wall
DeLancy levels of support

- **Proximal/apical vaginal level I**
  - Suspension by ligaments of paracolpium: uterosacral and cardinal
  - Damage: uterovaginal prolapse, posthysterectomy vaginal prolapse and enterocele

- **Midvaginal level II**
  - Lateral attachment of facial septa to pelvic sidewalls
  - Damage: paravaginal and pararectal defects

- **Distal level III**
  - Fusion of the deep endopelvic connective tissue septa to urogenital diaphragm anteriorly and proximal perineum posteriorly
  - Damage: urinary incontinence anteriorly, perineal body deficits and defecatory dysfunction posteriorly
Pelvic blood supply

- **Ovarian arteries**
  - Arise for anterior aorta, below renal arteries.
  - Within infundibulopelvic ligament
  - Supplies upper adnexal structures

- **Uterine artery**
  - Originates from internal iliac artery
  - Within cardinal ligaments
  - Anterior to ureter

- **Vaginal blood supply**
  - Extension of uterine artery along lateral sulci of vagina
  - Vaginal branch of internal iliac artery
  - Pudendal vessels distally
  - Middle and inferior hemorrhoidal vessels posteriorly
Pudendal nerve and artery

- Pudendal nerve
  - Sensory and motor nerve
  - Sacral plexus S2-S4

- Pudendal artery
  - Originates from anterior division of internal iliac artery

- Course
  - Leave the pelvis through the greater sciatic foramen

- Branches
  - Clitoral: lies on perineal membrane
  - Perineal: enters subcutaneous tissues of vulva behind perineal membrane. Supplies bulbocavernosus, ischiocavernous and transverse perineal muscles; skin of inner labia majora, labia minora and vestibule.
  - Inferior hemorrhoidal: external anal sphincter and perianal skin.
Bladder

- **Layers:**
  - Mucosa, submucosa, muscularis, and serosa or adventitia

- **Dome**
  - Responsive to beta/cholinergic stimulation → stimulated by sympathetic component of autonomic nervous system to suppress contraction of the detrusor
  - Parasympathetic stimulation → contraction causing bladder emptying

- **Base**
  - Urinary trigone
    - Smooth muscle
  - Internal sphincter: smooth muscle extending to bladder neck
    - Primary receptors are alpha-adrenergic receptors → contract favoring continence
  - External sphincter: striated

- **Blood supply**
  - Superior vesical artery: from obliterated umbilical artery
  - Inferior vesical artery: internal pudendal a. or vaginal a.
Ureter

- Pathway
  - Ureteropelvic junction
  - Descend down the abdomen along anterior surface of psoas major
  - Pelvic brim: cross the bifurcation of common iliac arteries
  - Posterior to ovary medial to ovarian artery
  - Deep to broad ligament and through cardinal ligament
  - Uterine artery crosses anteriorly in rectouterine fold of peritoneum

- Total length 25-30cm
- Layers
  - Viscera
  - Muscle: outer longitudinal, intermediate circular, inner longitudinal
  - Mucosa: transitional epithelium
- Constrictions
  - Pelvic brim, uterine vessels, intravesical junction
References

• Williams Gynecology


Questions?