Conflicts of Interest

- I have no conflicts of interest relevant to this talk
- Other relationships
  - Astra Zeneca - consulting
  - Merck - consulting/research
  - Genentech - consulting/speaker’s bureau
  - Clovis - consulting
  - Tesaro - consulting
  - SutroBio - consulting
  - OncoMed - consulting/research
  - BMS - research
Objectives

• Structures
  – Spaces and Landmarks
  – Vascular Anatomy
  – THE Ureter
  – Lymphatic Anatomy
  – Neurologic Anatomy
• Correlation of Anatomy with Surgical Procedures

Please

• e-mail me if you have questions!
• e-mail me if you want videos!
• e-mail me if you are interested in visiting us!

wnaumann@mac.com
Anatomy as the Basis of Medicine

Andreas Vesalius
1514-1564
De Humani Corpus Fabrica by Andreas Vesalius, Padua, Italy (1543)

Superficial

Highly variable branching pattern - often can be transilluminated
Anterior Abdominal Wall

Inferior Epigastric
Inferior Epigastric

Ilioinguinal and Iliohypogastric Nerves

Injury unlikely with trocar placement but more likely in 10 mm port that require closure

Ilioinguinal and Iliohypogastric

- Injury in 3.7% of Pfannenstiel incisions
  - associated with length of incision esp. if past lateral rectus sheath
- Distribution near lower port sites but injury with trocar uncommon
- Most often injured in fascial closure (entrapment) or neuroma from injury
- Diagnosis
  - Sharp burning pain emanating from the incision and radiating to suprapubic area, labia or thigh
  - Paresthesia over the appropriate nerve distribution
  - Pain relief after infiltrating with local anesthetic
  - Symptoms often worse with Valsalva and can be relieved with hip flexion
- Requires weekly injection with analgesic/steroids, neurolysis, or resection

Genitofemoral Nerve

- often injured removing sidewall masses of pelvic nodes
- consequences minimal (patch of sensory neuropathy)
Pelvic Sidewall

Iliohypogastric
Ilioinguinal
Genital-Femoral
Lateral Femoral Cutaneous
Common Peroneal
Superficial Peroneal
Saphenous
The Pelvic Spaces

• Para-rectal Space
  – Ureter medially
  – Iliac vessels laterally
  – Cardinal ligament

• Para-vesical Space
  – superior vesical artery medially
  – iliac vessels laterally
  – Cardinal ligament

• Presacral Space
• Space of Retzius

Ureters through Pelvis

Para-vesical space
Para-rectal space
Pre-sacral space
Paravesical and Pararectal Spaces

Hypogastric Nerve Trunk
Superior Hypogastric Nerve Plexus

Abnormal Obturator Vessels

Abnormal obturator vessels are present in 25% of cases
Aberrant Obturator Vein

Vascular Complications
Vascular Anatomy

• Common Iliac
• External Iliac
  – Deep circumflex, inferior epigastric
• Internal Iliac
  – Posterior Division
    • ilolumbar, lateral sacral, superior gluteal
  – Anterior Division
    • uterine, inferior gluteal, pudendal, superior vesical, obturator, vaginal, inferior vesical

Umbilicus Relative to Weight
Caution if in Trendelenburg

Beware the Common Iliac Veins!
Major Vascular Injury during Trocar Insertion

![Graph showing vascular injuries during trocar insertion.](image)

Vessels of the Pelvis

![Image of pelvic vessels.](image)
Unanticipated Finding
Uterine Vessels

- Uterine artery often travels inferiorly and branches before entering uterus

The Ureter

- Retroperitoneal and enters the pelvis just superior to the bifurcation of the common iliac artery
  - if you can’t find it -> dissect higher!!
- Underneath ovarian vessels (but close) at the pelvic brim
- Medial to the internal iliac/superior vesical arteries
- Under uterine artery
- Trigone is right on top of the cervix!!
Pelvic Ureter

Ovarian vessels are tortuous and ALWAYS close to the ureter - GOT to FIND it!

Can always find at the pelvic brim - make the incision higher if you are struggling!
Ureter at Pelvic Brim

Finding the Ureter
Ureters and Bladder

Ureter enters bladder at the edge - BE CAREFUL!

Cross Sectional Anatomy
Uterine Manipulators

The Koh Ring and Ureter Position
Taking the Uterine Arteries

Abnormal Mass
Ectopic Kidney

Ways to Injure the Ureter at the Cuff

- Ureter accidentally nicked while ligating paravaginal tissue
- Bladder wall accidentally nicked with needle
- Cut edge of peritoneum
- Stump of left round lig.
- Stump of left uterine vessels
- Vaginal vault closure
- Ureter accidentally ligated with cardinal lig.
- Stump of rt. infundibulopelvic lig.
Thank you!