

Surgical Anatomy

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Objectives

- ⊗ Review pelvic anatomy with clinical correlations
- ⊗ Supports of pelvic structures
 - ⊗ Muscles
 - ⊗ ligaments
- ⊗ Describe blood & nerve supply to the pelvic viscera
- ⊗ Describe the course of the ureter



The Bony Pelvis

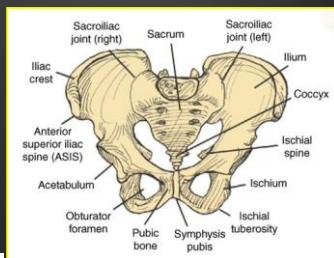
- ⊗ 2 hip bones

3 parts:

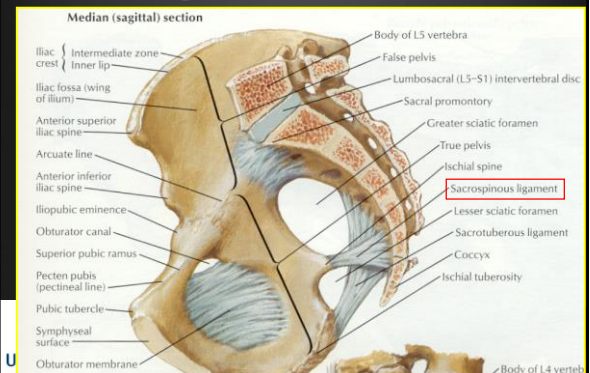
Ilium
Ischium
Pubis

- ⊗ Sacrum

- ⊗ Coccyx



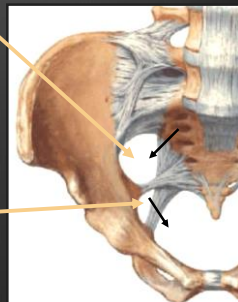
Sagittal section Pelvis



Pelvic Openings

Greater sciatic foramen
Gluteal vessels, internal pudendal vessels and nerves, sciatic nerve (leave pelvis)
Pyriformis**

Lesser sciatic foramen
Internal pudendal vessels and nerves (enter pelvis)
Obturator internus



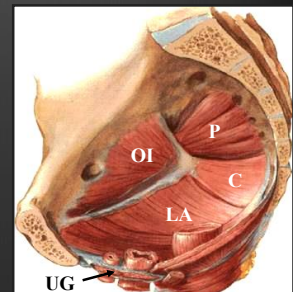
Muscles of Pelvis– lateral view

Back wall- Piriformis

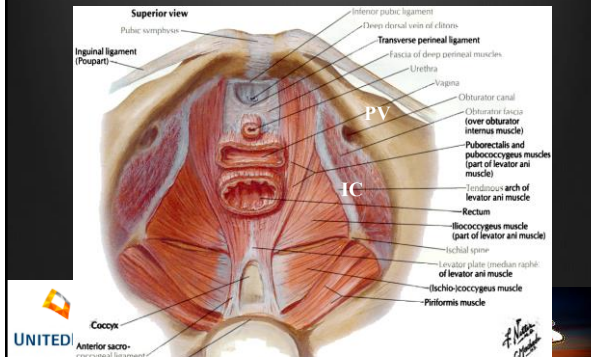
Sidewalls- Obturator internus

Floor:

- Pelvic Diaphragm:
 - Levator ani + coccygeus
- UG diaphragm (Perineal membrane)

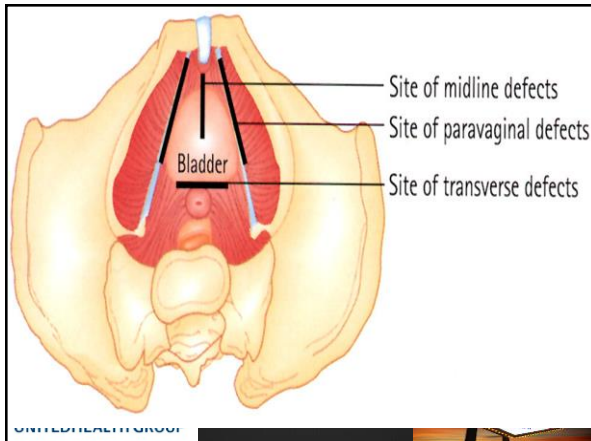
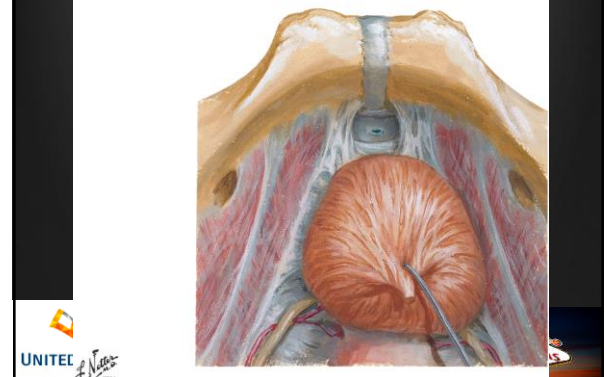


Muscles of pelvis- superior view

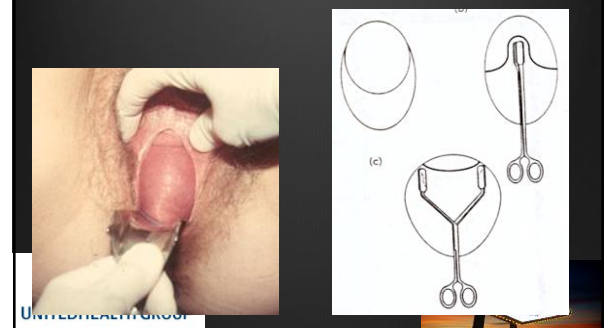


Urinary Bladder - Orientation and Supports

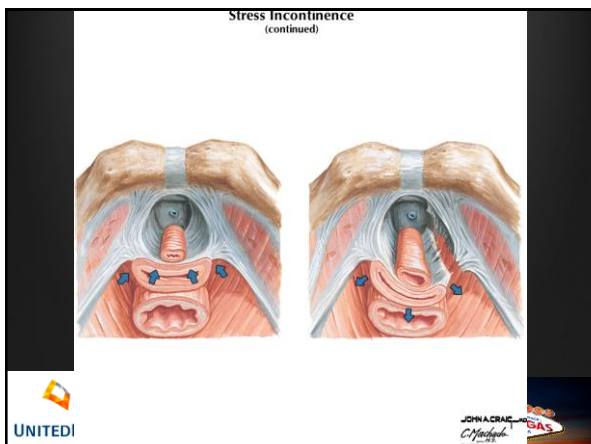
Superior View - with peritoneum and vesical fascia removed



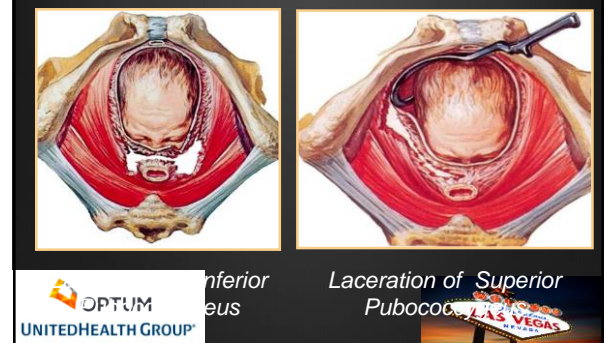
Anterior Vaginal wall defect:-Cystocele



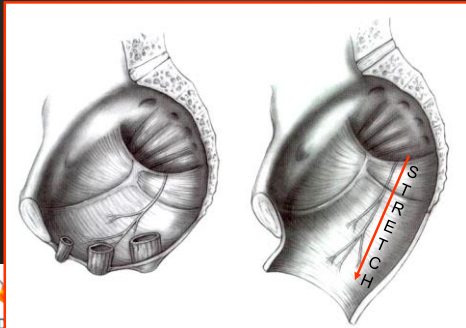
Stress Incontinence (continued)



Direct Mechanical Injury



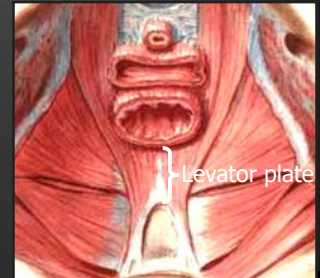
Proposed Mechanism of Nerve Injury to Levator Ani During Childbirth



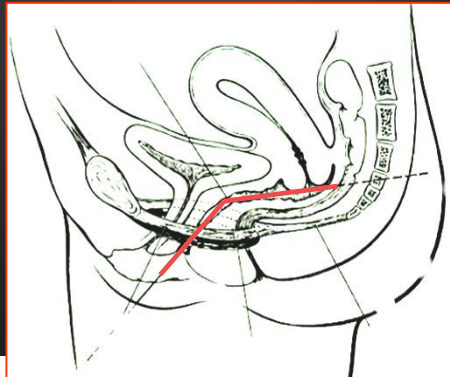
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Levator Plate

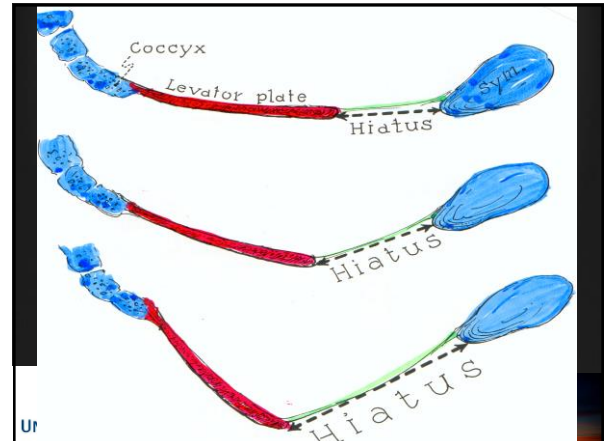
- ⊗ Clinical term
- ⊗ Region between anus & coccyx
- ⊗ Anococcygeal raphe
- ⊗ Supportive shelf on which rectum, upper vagina, & uterus rest



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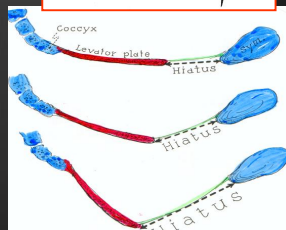
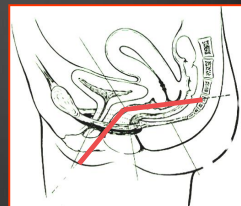


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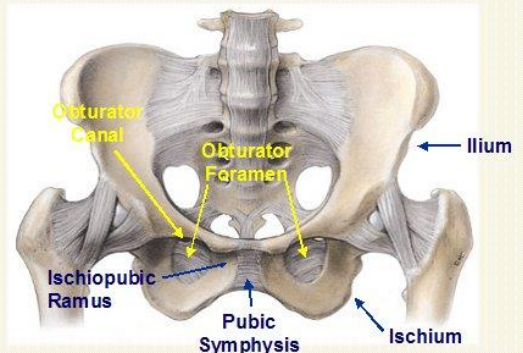
Closed GH

Open GH

Wide Open GH



Obturator Anatomy



Endopelvic fascia: Cardinal-USL Complex

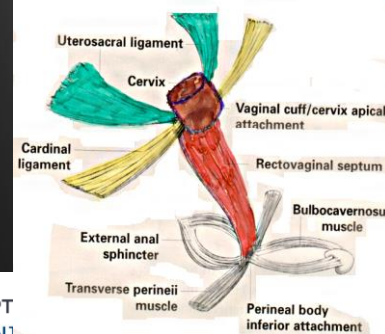
- ❖ 3-D meshwork of collagen, elastin, & smooth muscle
- ❖ Transmits neurovascular supply to pelvic organs
- ❖ Attaches viscera to pelvic walls
- ❖ USL: Visible and palpable medial part of complex



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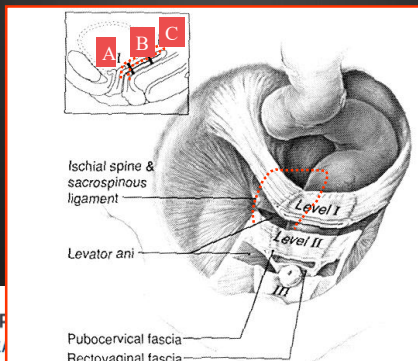
Ligaments serve as secondary supports

Vaginal support system

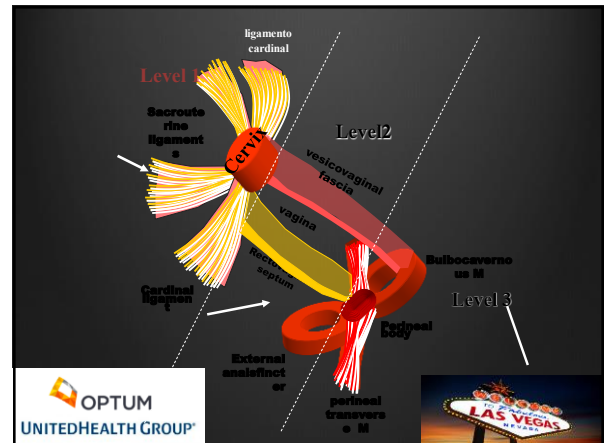


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Connective Tissue Support of the Vagina

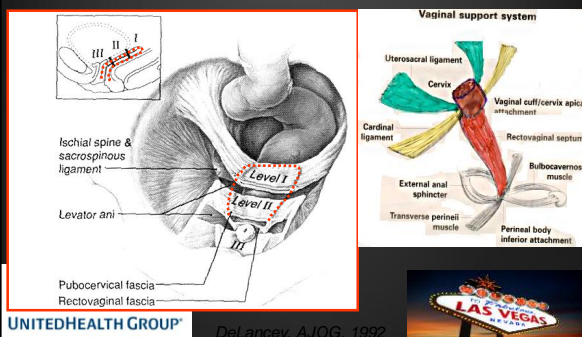


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Connective Tissue Support of the Vagina: Level I

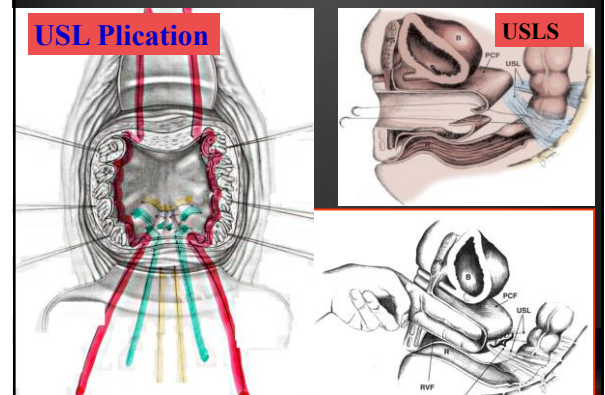


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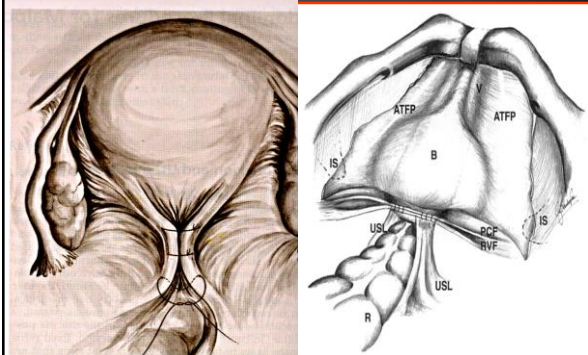
DeLancey, AJOG, 1992

Vaginal approach

USL Plication



USLS: Abdominal approach



USLS - Laparoscopic Approach

1-2 cm proximal and medial to IS

87-97% success

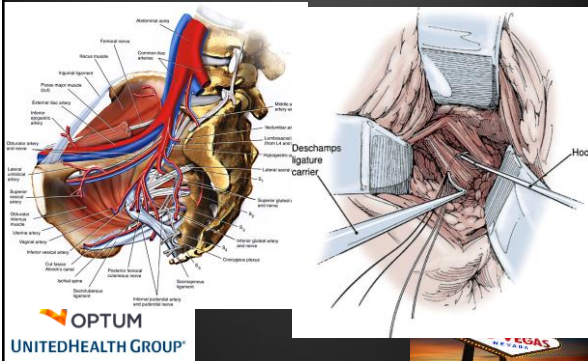
11% ureteral injury

Limiting factor



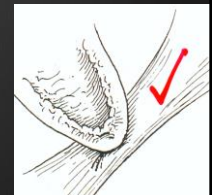
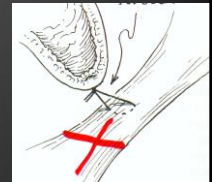
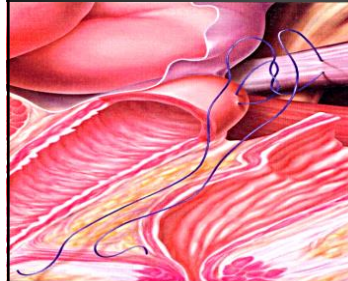
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SSL Fixation



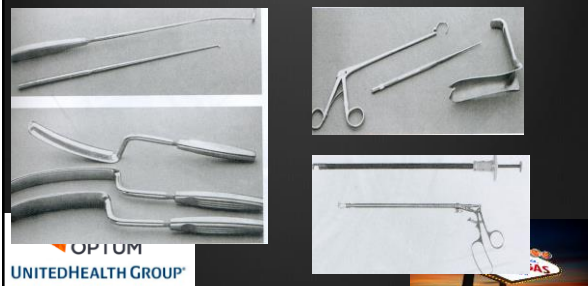
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SSL Fixation



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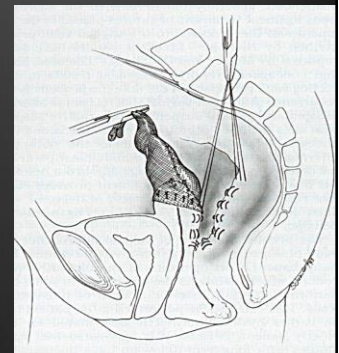
Instrument for SSLF



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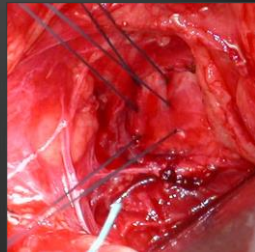
Sacrocolpopexy

Attached to upper 1/3 of the sacrum S3



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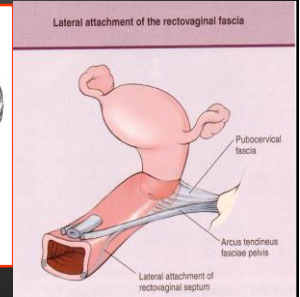
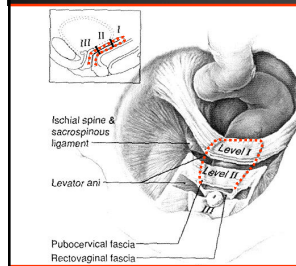
Apical Support: SacroColpopexy



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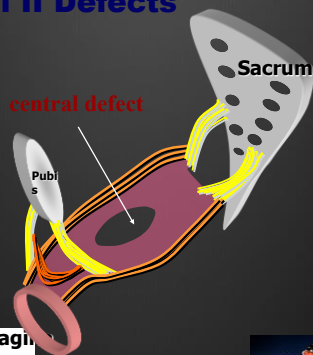
Sacral
Attachment

Connective Tissue Support of the Vagina: Level II



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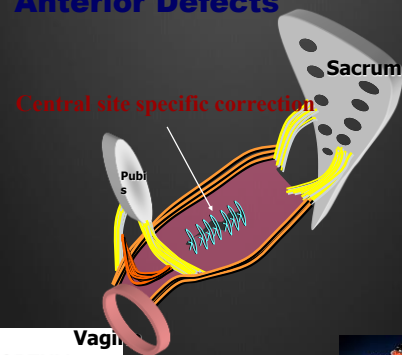
Level II Defects



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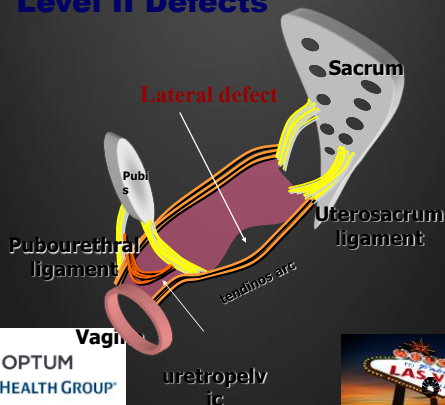
Anterior Defects



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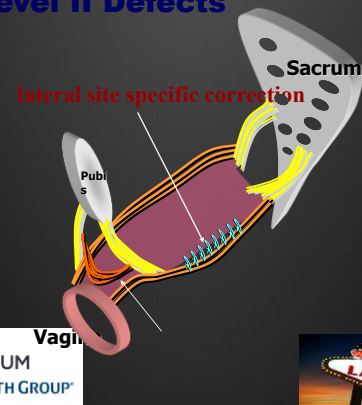
Level II Defects



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Level II Defects

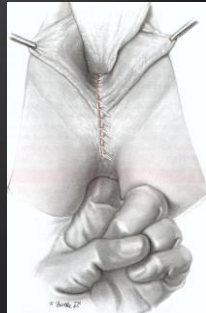
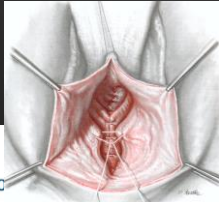


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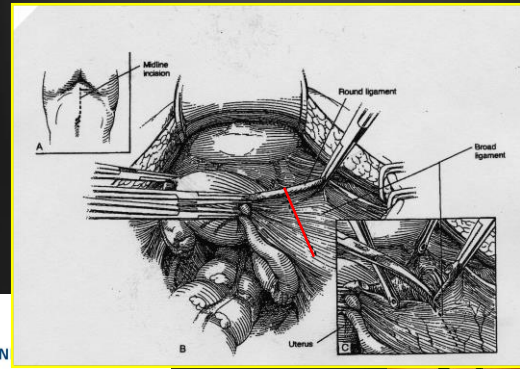
Level III Defect

- ⊗ Distal rectoceles-detachment of RVF from perineal body
- ⊗ Perineal descent

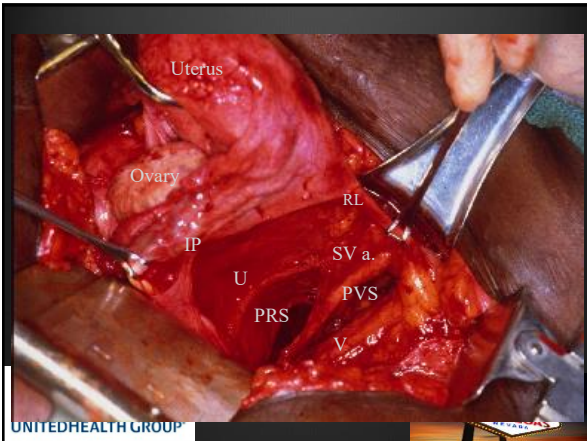


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Surgical Approach to the Retroperitoneum



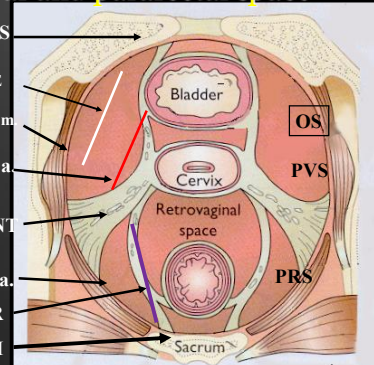
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Paravesical and pararectal space

PUBIC SYMPHYSIS
OBTURATOR NERVE
OBTURATOR INTERNUS m
SUPERIOR VESICAL a
CARDINAL LIGAMENT
HYPOGASTRIC a
URETER



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Pelvic Vascular Anatomy



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Pelvic Vascular Anatomy

Internal Iliac Artery

- ⊗ Common internal iliac artery
- ⊗ Posterior division
 - ⊗ Superior gluteal
 - ⊗ Iliolumbar
 - ⊗ Lateral sacral
- ⊗ Anterior division
 - ⊗ variable branching pattern
 - ⊗ 9 major patterns, 49 subtypes

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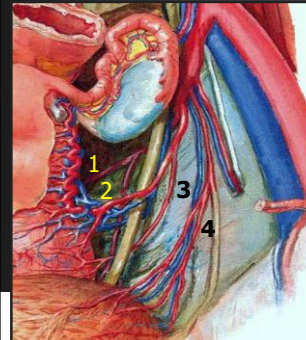


Pelvic Vascular Anatomy

- ⊗ Anterior Division
 - ⊗ 5 Visceral branches
 - ⊗ Uterine
 - ⊗ Vaginal
 - ⊗ Superior vesical (inferior)
 - ⊗ Middle hemorrhoidal
 - ⊗ Inferior hemorrhoidal
 - ⊗ 3 Parietal branches
 - ⊗ Obturator
 - ⊗ Inferior gluteal, internal pudendal



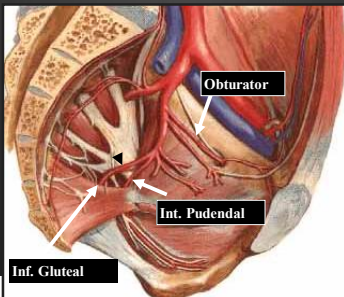
Anterior Division: Visceral Branches



1. Middle rectal
2. Uterine
3. Vaginal
4. Superior vesical



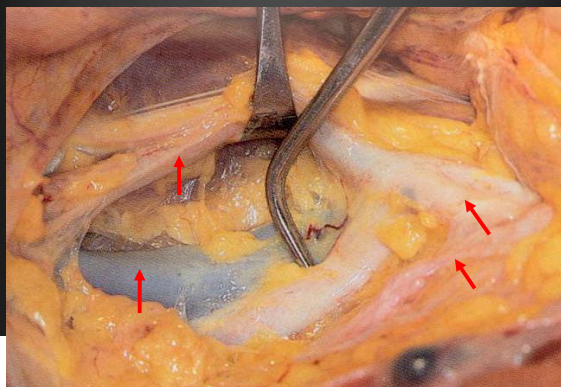
Anterior division: Parietal branches



Hypogastric artery Ligation



- ⊗ *Te Linde's Operative Gynecology*- "The posterior branch of the hypogastric artery must be clearly identified prior to selection of the point of dissection and double ligation of the anterior division with non-absorbable suture, No.0 or No. 1."



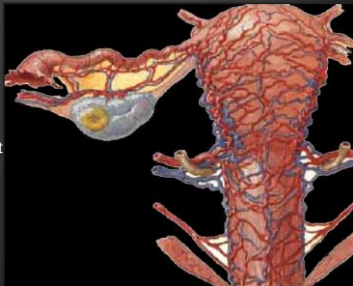
Extensive Collateral Circulation

- ⊗ Branches from the aorta
 - ⊗ Ovarian
 - ⊗ Inferior mesenteric
 - ⊗ Ilio-lumbar and vertebral
 - ⊗ Middle sacral
- ⊗ Branches from external iliac artery
 - ⊗ Deep iliac circumflex
 - ⊗ Inferior epigastric (obturator a.)
- ⊗ Branches from femoral artery
 - ⊗ Medial femoral circumflex, superficial and deep
 - ⊗ Lateral femoral circumflex



Ovarian Arteries

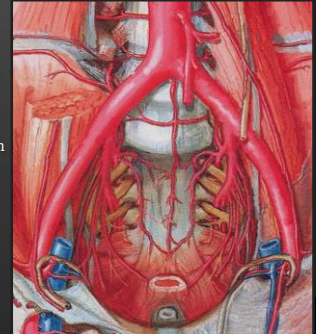
- ✿ Anastomoses with uterine a.
- ✿ Branches to fallopian tube & round ligament



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Median or Middle Sacral

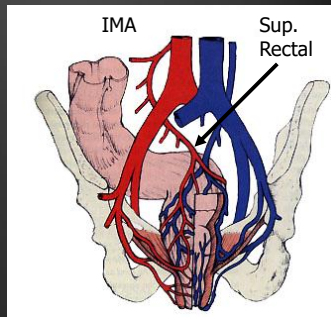
- ✿ From post wall aorta
- ✿ Anterior surface of sacrum
- ✿ Anastomoses with lumbar from aorta & ilio-lumbar & lateral sacral from post division of internal iliac



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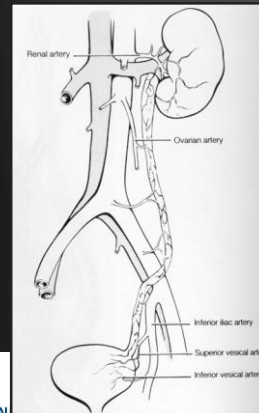
Superior Rectal (Hemorrhoidal)

- ✿ Terminal branch of inferior mesenteric artery
- ✿ Anastomoses with middle rectal from internal iliac & inferior rectal from internal pudendal



Posterior View

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Above pelvic brim: ureter lateral to blood vessels

Below pelvic brim: ureter medial to blood vessels

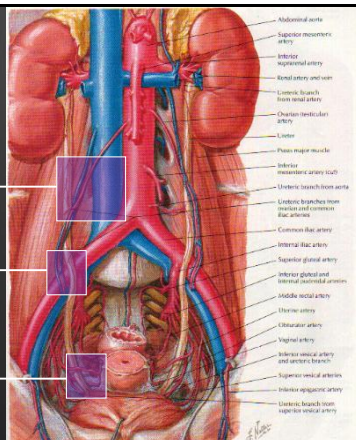
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Ureteral Injury Points

PALND

Transection of the Ovarian Vessels

Transection of the Uterine Vessels and Dissection of the Bladder Flap



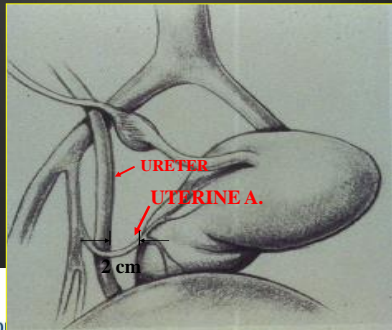
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Location of ureteral injuries

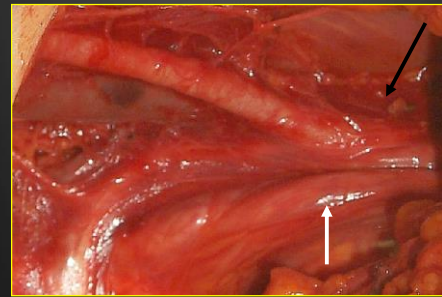
- ✿ During hysterectomy
 - Infundibulopelvic ligament
 - Uterine artery
 - Vaginal angle
- ✿ Uterosacral ligament suspension

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Vascular and Ureteral Injury During Hysterectomy

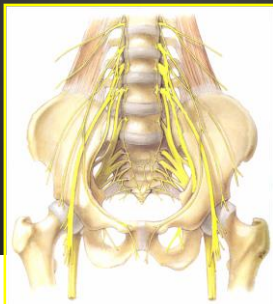


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- ✿ If you are having trouble finding the ureter then:
- ✿ Identify the ureter at bifurcation of common iliac (open para-rectal space)

Nerves in Gynecology



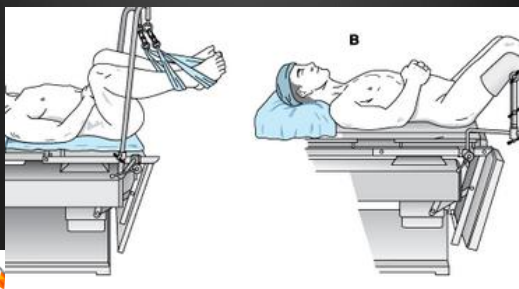
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Femoral Nerve

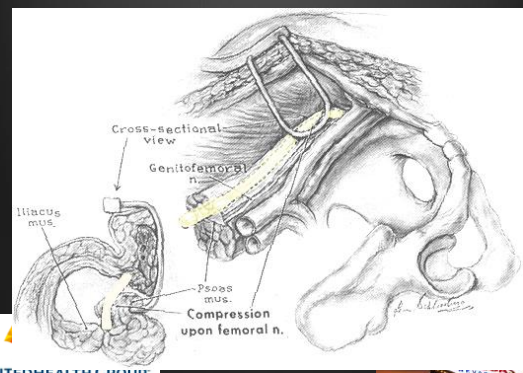
- ✿ L2, L3, L4
- ✿ Sensory nerves to anterior, medial thigh
- ✿ Motor to quadriceps muscles
 - ✿ Flexion of thigh, extension of knee
- ✿ Injury results in an inability to raise leg or walk, sensory loss anterior, medial thigh
- ✿ Injury types:
 - ✿ Neuropraxis (most common)
 - ✿ Transection (rare)

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Mechanism of Femoral Nerve Injury



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Obturator Nerve

- ⊗ L2, L3, L4
- ⊗ Sensory to medial aspect of thigh
- ⊗ Motor to adductor muscles of thigh
 - ⊗ Adduction and internal rotation of thigh
- ⊗ Injury results in difficulty walking due to bowing of leg;
 - ⊗ can not ride horses
- ⊗ Injury types:
 - ⊗ Transection (lymph node dissection, pelvic exenteration)
 - ⊗ Neuropraxia (hematoma, abscess—paravaginal repair)



External genitalia innervated by four nerve groups

1. Iliohypogastric (T12, L1)
2. Ilioinguinal (L1)
3. Genitofemoral (L1, L2)
4. Pudendal branches (S2, S3, S4)



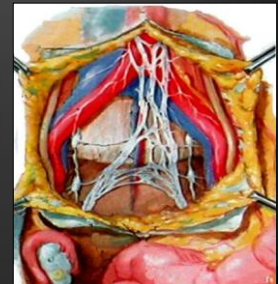
Pelvic Visceral Autonomic Innervations

- Superior Hypogastric Plexus (presacral nerve)
- Inferior Hypogastric (Pelvic) Plexus



Superior Hypogastric (Presacral) Plexus

- ⊗ Extension of aortic plexus below bifurcation
- ⊗ Pre & post ganglionic sympathetic fibers (T10 – L4 segments)
- ⊗ Pain fibers from uterus (T10 – L4)
- ⊗ Splits into the hypogastric nerves
- ⊗ **Presacral neurectomy**



Inferior Hypogastric Plexus

- ⊗ Visceral efferent & afferent nerves
- ⊗ Parasympathetic components predominate
- ⊗ Travels with branches of internal iliac vessels
- ⊗ **Bladder dysfunction with radical hysterectomy**

