





Reproduction Module

Neurovasculature of Pelvis & Perineum (SGD)

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Motto Vision ;The Dream/Tomorrow



- To impart evidence based research oriented medical education
- To provide best possible patient care
- To inculcate the values of mutual respect and ethical practice of medicine

Prof. Umar's Model of Teaching Strategy Self Directed Learning Assessment Program

Objectives : To cultivate critical thinking, analytical reasoning, and problem-solving competencies.

To instill a culture of self-directed learning, fostering lifelong learning habits and autonomy.

How to Assess?

➤Ten randomly selected students will be evaluated within the first 10 minutes of the lecture through 10 multiple-choice questions (MCQs) based on the PowerPoint presentation shared on Students Official WhatsApp group, one day before the teaching session.

➤ The number of MCQs from the components of the lecture will follow the guidelines outlined in the Prof. Umar model of Integrated Lecture.

Component	Core	Horizontal	Vertical	Spiral
of LGIS	Knowledge	Integration	Integration	Integration
No. of MCQs	6-7	1-2	1	1



Professor Umar Model of Integrated Lecture



Learning objectives

- Describe the neurovasculature of pelvis & perineum
- Discuss the anatomical relations of neurovascular structures in pelvis & perineum
- Describe the formation, course and supply of the lumbo-sacral plexus
- Correlate Physiology and Biochemistry (Horizontal Integration)
- Correlate clinical aspects / clinical conditions (Vertical integration)
- Able to focus on provision of curative and preventive health care measures
- Practice principles of Bioethics with professionalism/ communication skills
- Apply strategic use of AI in health care
- Able to read relevant research article
- Know how to use HEC Digital Library

INTERACTIVE SESSION



(a)

Common Iliac Artery





Core Knowledge Internal Iliac Artery Branches

Mnemonic : I love going places in my very own umbrella

- * I lleolumbar
- * L Lateral sacral
- * G Gluteal
- * P Pudendal
- * I Inferior vesicle
- * M Middle rectal
- * V Vaginal
- * O Obturator
- * U Umbilical





Anterior Division

Superior vesical artery:

- Proximal 2.5cm Persistent umblical artery
- Branches –
- 1) Branches to Upper part of bladder
- 2) 1 branch to Ductus deferens

Anterior Division

Obturator artery:

- <u>Relations</u> –
- 1) Up: obturator nerve
- 2) Down: obturator vein
- 3) Medial: ureter + ductus deferens + peritoneum
- 4) Lateral: obturator fascia
- Exits through obturator faramen
- <u>Branches</u> –
- 1) illiac branches to illiac fossa
- 2) Vesical branch to bladder
- Pubic branch to peritoneum on back of pubis (anastomose with a branch of the contra lateral side and inf. Epigastric artery)

Corona Mortis

Corona mortis is a connection between the internal iliac branch (obturator) and the external iliac artery or its branch, the inferior epigastric artery.

EXTERNAL ILIAC ARTERY

> - INFERIOR EPIGASTRIC ARTERY

CORONA

OBTURATOR



OBTURATOR

ACETABULAR BRANCH OF OBTURATOR ARTERY

POSTERIOR



Anterior Division

Middle rectal artery:

- Often absent in females
- Little blood supply goes to muscular coat of rectum
- Most blood supply goes to prostate and seminal vesicles

Inferior vesical artery:

 Supplies trigone of bladder, prostate, seminal vesicles and lower part of ureter



Anterior Division

Inferior gluteal artery:

- Largest branch of ant. Division
- Axial artery of lower limb
- Chiefly supplies buttock and back of thigh
- In pelvis supplies near muscles, base of bladder, seminal vesicles, prostate
- <u>Course</u>

In pelvis – runs in front sacral plexus and piriformis – passes below S1 nerve –below piriformis _comes out of greater sciatic foramen – gluteal region

Anterior Division

Internal peudendal artery:

- Small terminal branch
- Supplies perineum and external genitalia
- <u>Branches</u> inferior rectal, perineal, artery to bulb, urethra, deep and dorsal arteries

Vaginal artery:

- Corresponds to inf. Vesical artery of males
- Supply vagina, bulb of vestibule, base of bladder, adjacent rectum

Uterine artery:

- Tortuous course cross ureter 2cm lateral to cervix runs along uterus
- Supplies vagina, cervix, uterus, fallopian tube





Posterior Division

Iliolumbar artery:

- Runs upwards in front of sacroiliac joint and lumbosacral trunk
- Behind the obturator nerve, external iliac vessels and psoas major (divides into lumbar and iliac branches)
- Lumbar branch (L5 artery supplies psoas, QL & erector spinae) its spinal branch supplies the cauda equina
- Iliac branch supplies iliac fossa, iliacus and participates in ASIS anastomosis





Posterior Division

Lateral sacral artery:

- 2 in number (upper and lower)
- Runs downwards and medially over the sacral nerves
- Supply the sacral canal contents, muscles and skin on the back of sacrum



Posterior Division

Superior gluteal artery:

- Passes above the 1st sacral nerve
- Leaves the pelvis through GSF above the piriformis
- Supplies gluteus maximus
- Takes part in ASIS and Trochanteric anastomosis

Perineum - Vessels

Internal Pudendal Artery:

It is a branch of internal iliac artery & passes from pelvis through greater sciatic foramen & enters perineum through lesser sciatic foramen. Branches:

- Inferior rectal artery: supplies lower ½ of anal canal.
- Branches to the penis in male & Branches to labia & clitoris in female

Internal pudendal vein:

receives tributaries that correspond to branches of internal pudendal artery.









Venous Drainage





LUMBAR PLEXUS



Sacral Plexus



Sacral Plexus Formation



Lumbosacral Trunk



- <u>1.Lumbosacral trunk</u>:-
- Ventral ramus of L4 (descending branch)
- Whole of L5
- Course:-
- Ala of sacrum
- Crosses the pelvic brim
- Front of sacroiliac joint
- Joins S1 (LST is separated from S1 by superior gluteal vessels)
- 2. Rami S1 and S2 separated by inferior gluteal vessels
- <u>3.</u> Rami S2 ,S3 and part of S4 lie ,
- Ant. To piriformis _deep to pelvic fascia_behind internal iliac vessels and ureter.

Branches from both ventral and dorsal divisions

- Sciatic nerve: (Nerve of locomotion)
- Common peroneal component(dorsal divisions of L4,L5,S1,S2)
- **Tibial component** (ventral divisions of L4,L5,S1,S2,S3)
- Posterior cutaneous nerve of thigh:
- Dorsal divisions of S1,S2
- Ventral divisions of S2,S3

Branches from dorsal division (Supply extensors & abductors of limb)

- Superior gluteal nerve(L4,L5,S1)
- Inferior gluteal nerve(L5,S1,S2)
- Nerve to piriformis(S1,S2)
- Perforating cutaneous nerves(S2,S3)

Branches from ventral division (Supplies the flexors & adductors of limb)

- Nerve to quadratus femoris(L4,L5,S1)
- Nerve to obturator internus(L5,S1,S2)
- Pudendal nerve(S2,S3,S4)_Nerve of reproduction.
- Muscular branches to levator ani, coccygeus, external anal sphincter and perineal branch of S4
- Pelvic splanchnic nerves (S2,S3,S4)

Coccygeal plexus

- Formed by the ventral rami of S4 (descending branch), S5 and coccygeal nerves
- The three nerves join at the pelvic surface of coccygeus to form a small coccygeal plexus (supplying coccygeus and sacrococcygeal joint)
- The plexus gives anococcygeal nerves (supply skin of coccyx after piercing sacrotuberous ligament and small area of skin b/w tip of coccyx and anus)

Autonomic pelvic nerves

- Four routes:-
- <u>1.Sacral sympathetic trunks</u>(lie medial to pelvic sacral foramina and converge to form a small median ganglion impar in front of coccyx)
- It usually has 4 sympathetic ganglia
- Provide grey rami communicating branches to each ant. rami of sacral and coccygeal nerves(vasomotor, pilomotor & sudomotor)

- <u>2. Periarterial plexus (Minor route):</u>
- Ovarian, Superior rectal, internal iliac artery
- Primary function is **vasomotion** of arteries they accompany
- <u>3. Hypogastric plexus (Superior & inferior):</u>
- Network of sympathetic & visceral afferent nerve fibres
- <u>SHP Main part</u> is prolongation of intermesenteric plexus(carries L3,L4 splanchnic nerves)
- Location inferior to bifurcation of aorta
- Enters pelvis as rt. & lt. hypogastric nerves(within the hypogastric sheaths lateral to rectum & anterior to sacrum)
- Fan out laterally merge with pelvic splanchnic to form inferior hypogastric plexus

- IHP Contains
- Sympathetic Parasympathetic Visceral afferent fibres.
- They reach the pelvic viscera in hypogastric sheath
- Upon the pelvic viscera form pelvic plexuses
- Both sexes rectal & vesical
- In males only prostate, seminal glands
- In females only uterine, cervical & vaginal





- **<u>4.Pelvic splanchnic nerves :</u>** Arise from,
- Anterior rami of S2, S3, S4 spinal nerves of sacral plexus(part of craniosacral parasympathetic outflow via pelvic splanchnic)
- Visceral afferent fibres (greatest contribution from S3 spinal nerve)
- Sympathetic fibres via lumbar splanchnic nerves (inhibits peristalsis of rectum, contraction of internal genital organs), <u>NO pilomotion &</u> <u>vasomotion</u> (pelvis does not include cutaneous area)



Visceral Pain Lines



Pelvic Pain Line

- Threshold determining the course of visceral pain sensation
- Associated with the inferior peritoneum
 - Structures above or in contact with the inferior peritoneum convey visceral pain sensation via sympathetic splanchnic nerves
 - Structures <u>below the inferior peritoneum</u> convey visceral pain sensation via parasympathetic pelvic splanchnic nerves





*midway point of sigmoid colon is exception to pelvic pain line specific to GI tract

MDA Table 3.3

Meralgia paresthetica



Foot Drop

Normal Foot

Drop Foot

(Inability to lift the front part of the foot off the ground)

Peroneal Nerve

ePainAssist.com

Injury to pelvic nerves

During childbirth; fetal head may compress the nerves of mother's sacral plexus Produce lower limb pain 26

NisiPilar ker

Obturator nerve is vulnerable to injury during surgery.

Injury of this nerve cause;

- 1. Painful spasm of adductor muscles of thigh.
- 2. And sensory deficits in the medial thigh region.

PIRIFORMIS SYNDROME





Pudendal Nerve Palsy -Bicyclist Injury TREATMENT Condition is usually transient and improves with time.

• rest

- physical therapy
- stretches and exercises
- anti inflammatory medication
- injection / nerve block
- surgery

 (as a last resort)

Pudendal Nerve Palsy -**Bicyclist Injury** Damage to the pudendal nerve can occur suddenly as a result of trauma to the pelvic region, prolonged bicycling, fractures or from falls. Bicyclist

Injury







Pudendal Block





Vertical Integration Caudal epidural block

It is a commonly used technique for surgical anesthesia in children and chronic pain management in adults. It is performed by inserting a needle through the sacral hiatus to gain entrance into the sacral epidural space



Figure 1. Posterior view of the injection in the hiatus.

Clinical Correlation: Anesthesia for Parturition

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Spinal anesthesia via lumbar puncture into subarachnoid space

 Produces complete anesthesia of uterus, cervix, vagina, perineum, lower extremities, and inferior abdominal wall

 Most-common form of anesthesia for cesarean section

 Lumbar epidural (not shown) produces similar anesthesia to caudal epidural, but with greater anesthetic effect on uterus

> Most-common form of anesthesia for vaginal delivery

 Caudal epidural nerve block via injection through sacral hiatus and canal

 Bathes S2-S4 spinal nerve roots, anesthetizing the cervix, vagina, and perineum

• *Does not* affect sensation from structures above pelvic pain line (body and fundus of uterus)

Pudendal nerve block

Local anesthesia of perineum only (S2-S4 dermatomes)



pelvic pain line

Spiral Integration

A ative I istaning

Biomedical Ethics

Communication Skills

Interpersonal Skills in the Workplace



Affirming the speaker as they're talking and asking clarifying

Active Listening	questions when they're done		
Collaboration	Facilitating a brainstorm session with teammates to solve a problem together		
Empathy	Regularly checking in with coworkers and offering space to tal about anything that's challenging them		
Respect	Fostering an inclusive work environment by listening to everyone's contributions and opinions		





The Journal of Pain

Available online 16 February 2024, 104500 In Press, Corrected Proof (2) What's this?



Research Article

Reduction of Chronic Primary Low Back Pain by Spinal Manipulative Therapy is Accompanied by Decreases in Segmental Mechanical Hyperalgesia and Pain Catastrophizing: A Randomized Placebocontrolled Dual-blind Mixed Experimental Trial

https://www.sciencedirect.com/science/article/abs/pii/S152659002400381X

The efficacy of SMT have suggested that its nonspecific clinical effects showed specific pain reduction. The study shows that SMT produces greater pain relief compared with a control intervention.

Spiral Integration

Artificial Intelligence



- AI-can potentially aid in enhancing diagnostic accuracy and efficiency
- Al-powered decision support system can also help clinicians in selecting appropriate treatment modalities
- Al-driven predictive models may help anticipate the risk of complications and recurrence in susceptible populations

How To Access Digital Library

- Steps to Access HEC Digital Library
- 1. Go to the website of HEC National Digital Library.
- 2. On Home Page, click on the INSTITUTES.
- A page will appear showing the universities from Public and Private Sector and other Institutes which have access to HEC National Digital Library HNDL.
- 4. Select your desired Institute.
- 5. A page will appear showing the resources of the institution
- 6. Journals and Researches will appear
- 7. You can find a Journal by clicking on JOURNALS AND DATABASE and enter a keyword to search for your desired journal.

Video



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