
MIDLANDS SURGICAL
ANATOMY TEACHING
SERIES



MSATS
HANDOUT
2021/22

The background of the title text is a detailed anatomical illustration of the human torso, showing the muscular structure of the abdomen and chest. Numbered points (1 through 10) are marked on the illustration, likely corresponding to specific anatomical features or points of interest discussed in the handout.

High Yield | Surgical Relevance | CPD Accredited

PELVIS ANATOMY

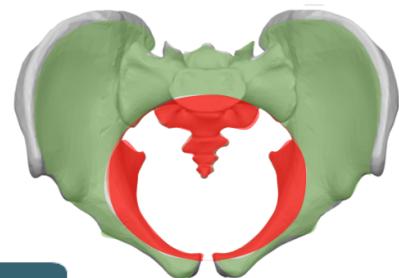
Objectives: Understand the bony anatomy of the pelvis, the muscles of the pelvic floor and the gross anatomy & neurovascular supply of the uterus, ovaries, fallopian tubes, cervix and vagina. Apply anatomical knowledge in context of common procedures within obstetrics and gynaecology.

Greater Pelvis

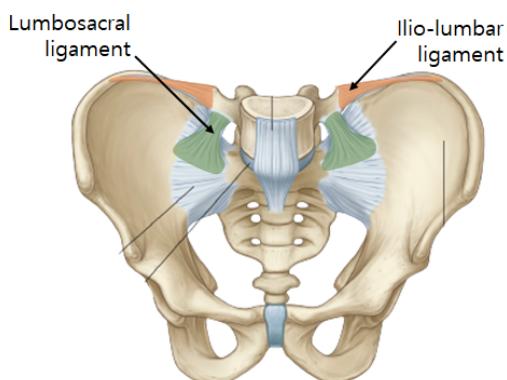
- Superior (above pelvic brim)
- Part of abdominal cavity

Lesser Pelvis

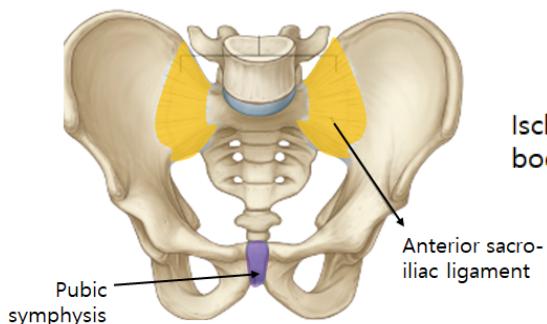
- Inferior (below pelvic brim)
- Encloses pelvic cavity and contains structures of urinary, GI, and reproductive system



Pelvic Joints

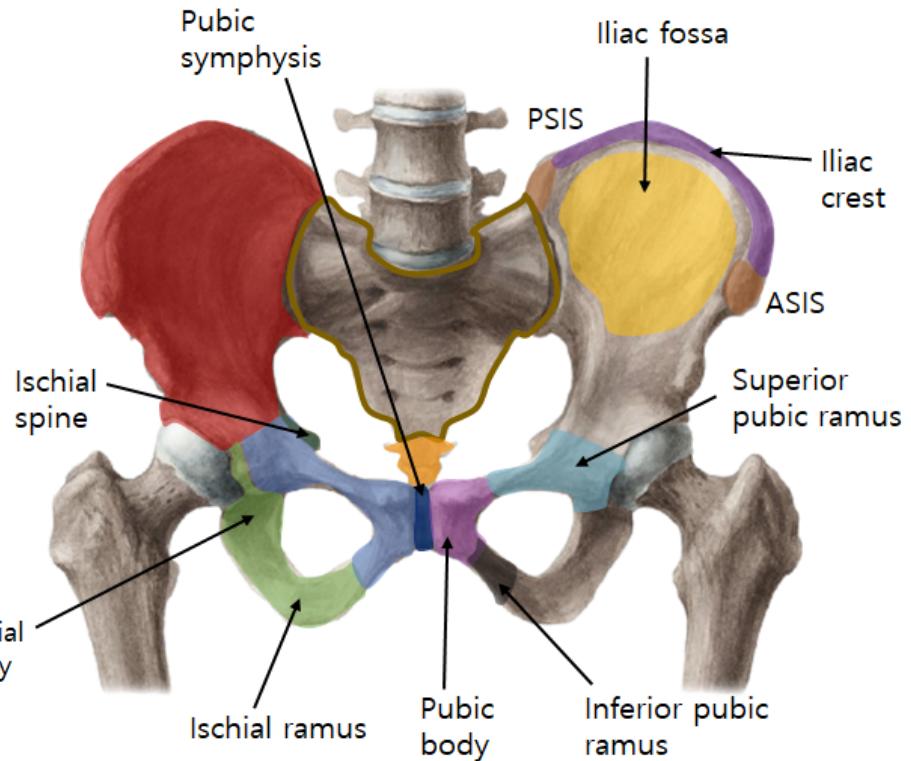


- Lumbosacral joint – sacrum with ilium
 - Lumbosacral ligaments
 - Ilio-lumbar ligaments



- Sacro-iliac joints – sacrum with pelvic bones
 - Anterior & posterior sacro-iliac ligament
 - Interosseous sacro-iliac ligament
- Pubic symphysis – anteriorly in midline

Bony Anatomy of the Pelvis



Male

- Pelvic inlet: heart-shaped
- Angle formed by pubic arch: 50–60 degrees
- Ischial spine – project medially into pelvic cavity

Female

- Pelvic inlet: circular
- Angle formed by pubic arch: 80–85 degrees
- Ischial spine – less prominent projection

Male vs Female Pelvis

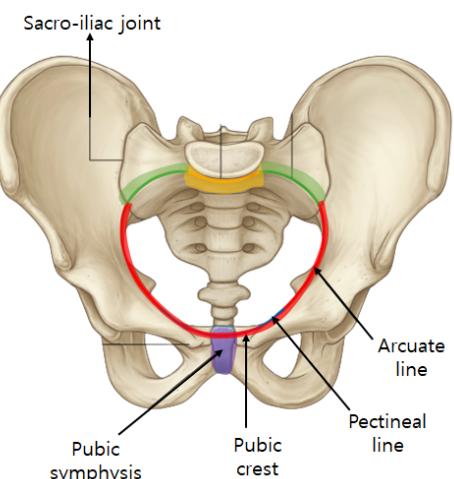
PELVIS ANATOMY

Objectives: Understand the bony anatomy of the pelvis, the muscles of the pelvic floor and the gross anatomy & neurovascular supply of the uterus, ovaries, fallopian tubes, cervix and vagina. Apply anatomical knowledge in context of common procedures within obstetrics and gynaecology.

Lesser (False Pelvis)

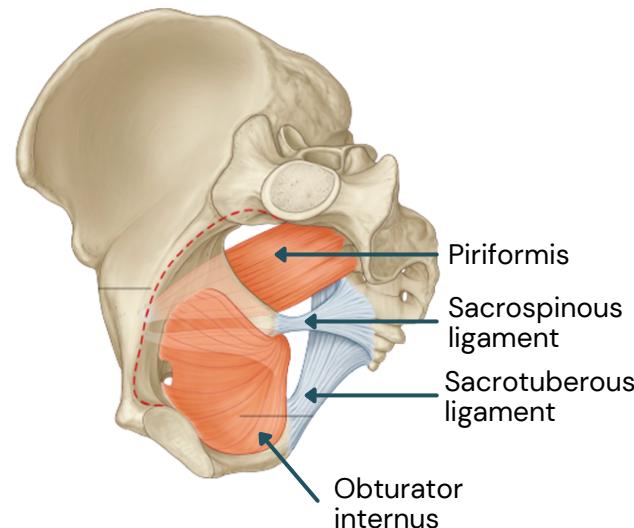
Pelvic Inlet

- Posteriorly – vertebral body of S1 (**sacral promontory**) + alae (**wings**) of sacrum
- Laterally – rim of ilium and superior pubic ramus (**linea terminalis**)
- Anteriorly – **pubic symphysis**



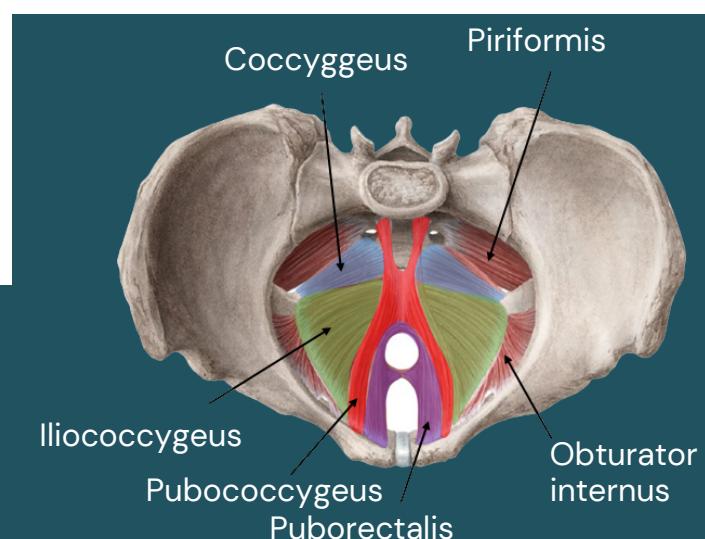
Pelvic Walls

3 Bones	Innominate bones, sacrum, coccyx
2 Ligaments	Sacrospinous Ligament (ischial spine to sacrum) Sacrotuberous Ligament (sacrum to ischial tuberosity)
2 Foramina	Greater Sciatic Foramen - superior to Sacrospinous Lig Lesser Sciatic Foramen - inferior to Sacrospinous Lig
2 Muscles	Obturator internus Piriformis



Pelvic Floor

- Pelvic floor: divides pelvic cavity + perineum
- Consists of: pelvic diaphragm + perineal membrane + deep perineal pouch
- Vagina and urethra penetrate pelvic floor to pass into perineum



Pelvic Floor Muscles

- Form pelvic floor, support pelvic viscera, reinforce sphincters
- 2 Muscles
 - Coccygeus
 - Levator ani muscles

PELVIS ANATOMY

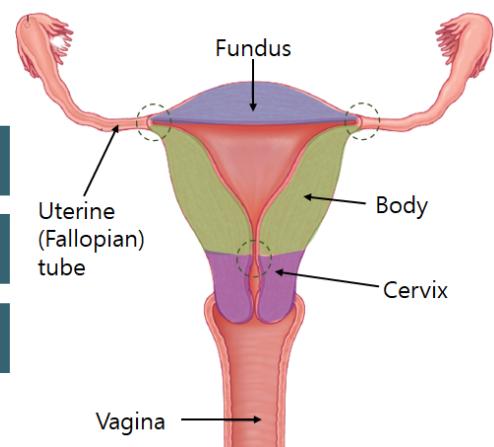
Objectives: Understand the bony anatomy of the pelvis, the muscles of the pelvic floor and the gross anatomy & neurovascular supply of the uterus, ovaries, fallopian tubes, cervix and vagina. Apply anatomical knowledge in context of common procedures within obstetrics and gynaecology.

Female Reproductive System

Uterus

- Thick-walled muscular organ located between bladder and rectum
- Usually:
 - Anteverted** (rotated anteriorly)
 - Anteflexed** (flexed anteriorly)

Fundus	Rounded superior end (above origin of uterine tubes)
Body	Contains narrow cavity (site of embryo implantation)
Cervix	Joins with vagina



Ligaments

Broad Ligament:
Double layer of peritoneum & encloses fallopian tube/ovaries

Mesometrium: largest part from lateral pelvic walls to uterus

Mesosalpinx: superior part and suspends fallopian tube

Mesovarium: posterior part which attaches to ovary

Uterosacral ligament

Extends from cervix to sacrum

Ligament of ovary

Attaches from inferior pole of ovary to uterus

Round ligament of uterus

Extends from uterus
--> inguinal canal
--> labium majus

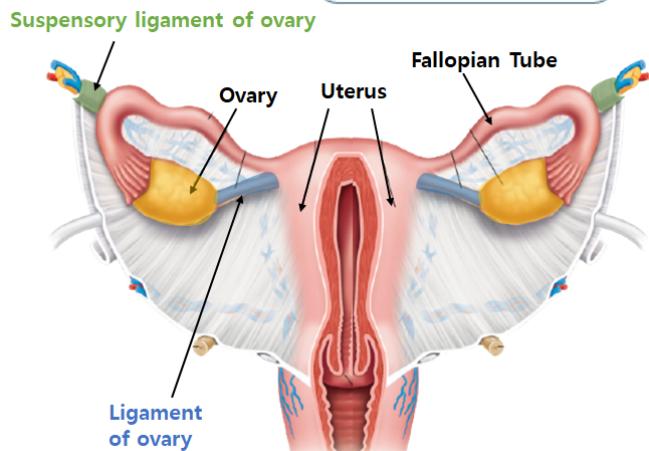
Cardinal Ligament

Base of broad ligament

Contains uterine artery and vein

Ovaries

- Function: site of egg production (oogenesis)
- Structure**
 - 2 almond-shaped
 - Suspended by **mesovarium**
- Ligaments**
 - Ligament of ovary:** ovary to fundus of uterus
 - Suspensory ligament of ovary:** contains ovarian vessels, nerves & lymphatics ("suspend the end")

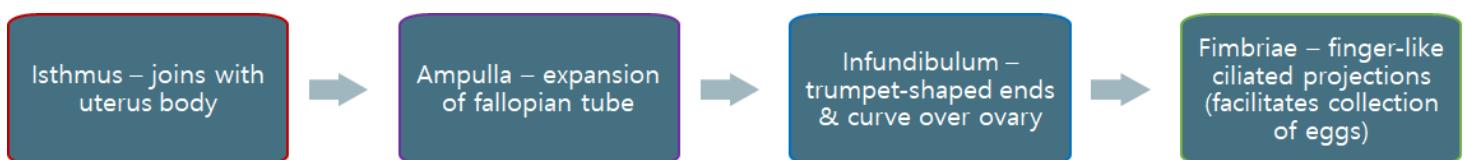


PELVIS ANATOMY

Objectives: Understand the bony anatomy of the pelvis, the muscles of the pelvic floor and the gross anatomy & neurovascular supply of the uterus, ovaries, fallopian tubes, cervix and vagina. Apply anatomical knowledge in context of common procedures within obstetrics and gynaecology.

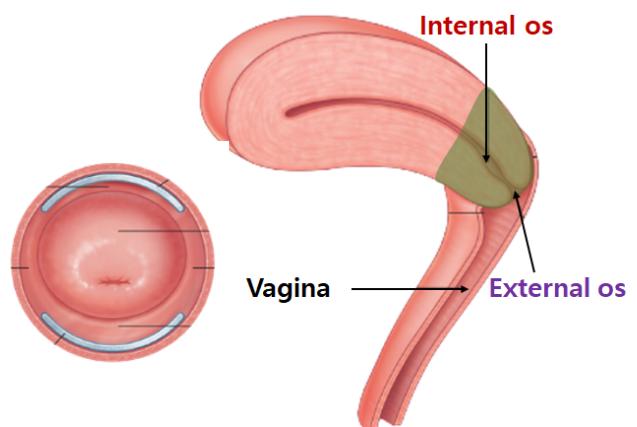
Fallopian Tube

- Muscular tubes extending from superior end of body of uterus to ovary
- Enclosed in upper margin of broad ligament (**mesosalpinx**)
- Course – pass superiorly and laterally to ovaries



Cervix

- Short, broad cylinder at inferior part of uterus
- **Function:** passage of sperm & maintain sterility of female reproductive tract
- Cervix is connected to the vagina distally
- **Connections:**
 - Internal os – central cervix opens **above** into uterine cavity
 - External os – central cervix opens **below** into vaginal cavity



Arterial Supply

- Internal iliac artery – supply pelvic viscera
 - Arises from common iliac at IV disc of L5/S1
 - Located medial to external iliac vein

- **Bladder** → **Superior vesical a.**
- **Uterus/Cervix** → **Uterine a.**
- **Vagina** → **Vaginal a.**
- **Perineum** → **Internal pudendal a.**
- **Ovaries** → **Ovarian a.**

Note: Ovarian (gonadal) artery from abdominal aorta to supply the ovaries and fallopian tubes

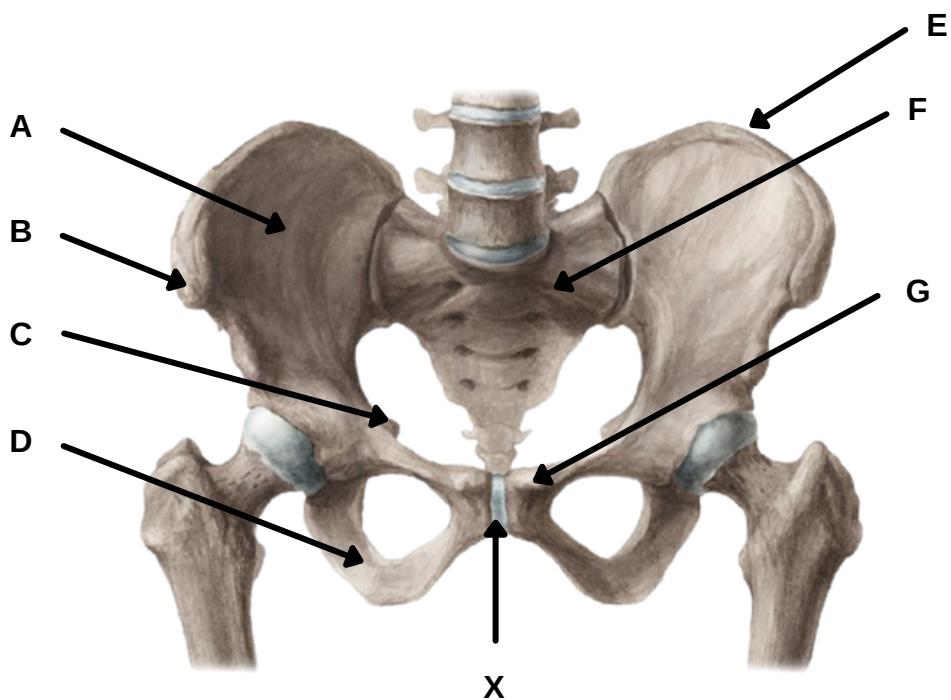
Innervation

- Mixed autonomic innervation enter through inferior hypogastric plexus
- **Parasympathetic:**
 - Pelvic splanchnic nerves – S2–S4 – penetrate pelvic floor to innervate erectile tissue in females and males (vasodilation)
- **Sympathetic:**
 - Fibres supply blood vessels, accessory reproductive glands, cause contraction of internal anal and urethral sphincter
- **Pudendal nerve (SOMATIC INNERVATION)**
 - Leaves pelvic cavity via greater sciatic foramen to enter gluteal region
 - Then around ischial spine and enters lesser sciatic foramen to enter perineum
 - Sensory: supplies skin of perineum/ external genitalia.
 - Motor: skeletal muscle of perineum.

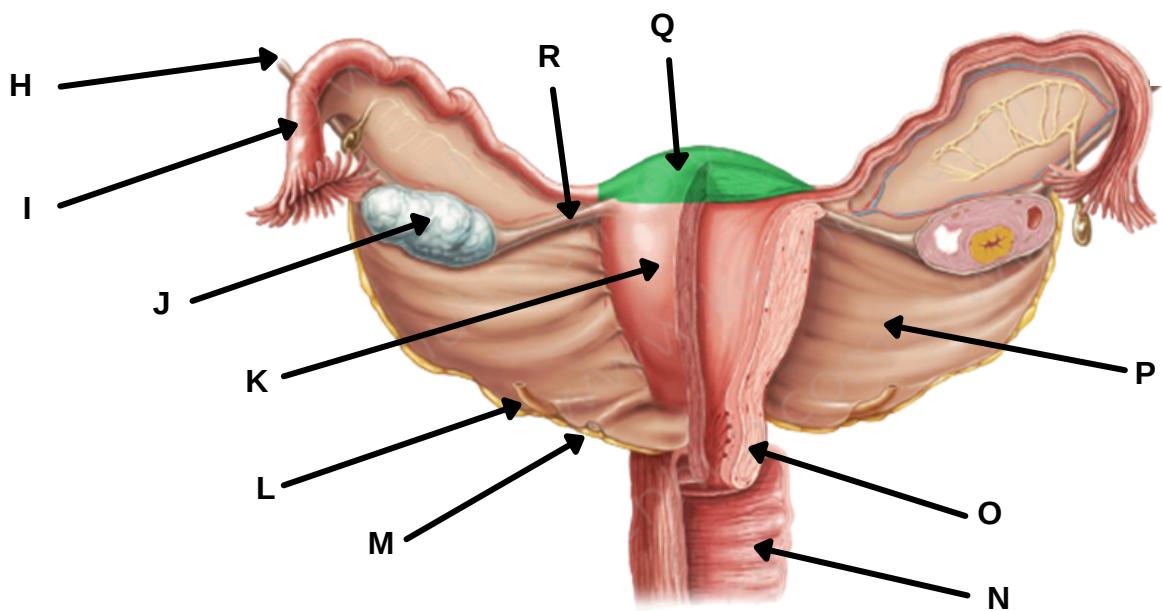
PELVIS ANATOMY

Test yourself...

1) Label the structures of the pelvis



2) Label the structures of the female reproductive system



PELVIS ANATOMY

Test yourself...

MCQ 1

Which of the following is not a part of the pelvic floor?

- A. Coccyeus
- B. Iliococcygeus
- C. Pubococcygeus
- D. Piriformis
- E. Puborectalis

MCQ 2

Which of the following contains the uterine artery and vein?

- A. Broad ligament
- B. Uterosacral ligament
- C. Cardinal ligament
- D. Ligament of ovary
- E. Suspensory ligament of ovary

MCQ 3

Which of the following contains the ovarian artery and vein?

- A. Broad ligament
- B. Uterosacral ligament
- C. Cardinal ligament
- D. Ligament of ovary
- E. Suspensory ligament of ovary

MCQ 4

In which part of the fallopian tube does fertilisation take place?

- A. Isthmus
- B. Ampulla
- C. Infundibulum
- D. Fimbriae
- E. Entry point to uterus

MCQ 5

Which nerve leaves the pelvic cavity via greater sciatic foramen, passes around the ischial spine and re-enters the pelvis via the lesser sciatic foramen?

- A. Sciatic nerve
- B. Pudendal nerve
- C. Femoral nerve
- D. Obturator nerve
- E. Gluteal nerve

MCQ 5

The ligament of ovary and round ligament of uterus are embryological remnants of which structure?

- A. Right umbilical vein
- B. Mesonephric duct
- C. Ovarian vein
- D. Gubernaculum
- E. Wolfian duct

MCQ 6

Which spinal levels do pelvic splanchnic nerves originate from?

- A. S2-S4
- B. S2-S5
- C. S3-S5
- D. S1-S5
- E. S1-S4

PELVIS ANATOMY

Test yourself...

OSCE Station – Case Based Discussion

A 65-year-old woman with class III obesity (BMI 41) with hypertension and diabetes presents with post-menopausal vaginal bleeding, 12 years after the menopause. She has never been pregnant. She has a first-degree relative and a second-degree relative who had endometrial cancer. Bleeding is scant but has persisted for more than 1 month. She has not recently used hormone replacement therapy and she had a normal Pap smear 6 months previously. Vaginal examination reveals evidence of recent bleeding.

(BMJ Best Practice)



Q1. Which specific risk factors from the history are concerning?

Q2. What would be your differential diagnosis?

Q3. What investigations would confirm your diagnosis?

Q4. What are the treatment options?

Q5. What is the aetiology of endometrial hyperplasia?

OSCEs: Obesity, Age >50, unopposed oestrogen exposure (nulliparity), first degree relative with endometrial cancer
 1) Obesity, Age >50, unopposed oestrogen exposure (nulliparity), first degree relative with endometrial cancer
 2) Endometrial cancer, cervical cancer, trauma, atrophic endometrium
 3) Pelvic (transvaginal) ultrasound scan, endometrial biopsy, hysteroscopy, pap smear
 4) Surgery (hysterectomy), radiotherapy, chemotherapy, hormonal therapy = combination of treatments
 5) Proliferation of endometrial glands resulting in a greater gland-to-stroma ratio. Commonly resulting from chronic oestrogen stimulation unopposed by progesterone.

Labels 1: H = suspensory ligament of ovary, I = fallopian tube, J = ovary, K = body of uterus, L = cardinal ligament, M = uterosacral ligament, N = vagina, O = cervix, P = broad ligament, Q = fundus of uterus, R = tubercle X = pubic symphysis;
 Labels 2: I = ilium / iliac fossa, B = ASIS, C = ischial spine, D = ischium, E = iliac crest, F = sacrum, G = pubic ligament of ovary

MCQs: 1 = D, 2 = C, 3 = E, 4 = B, 5 = D, 6 = A

Answers 1: A = ilium / iliac fossa, B = ASIS, C = ischial spine, D = ischium, E = iliac crest, F = sacrum, G = pubic ligament of ovary