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INTRODUCTION

-The term pelvis is derived from the Latin word, which means basin.

-The bony pelvis is formed by the following four bones:

(a) Two hip bones, one on either side.

(b) Sacrum, behind.

(c) Coccyx, behind.

-These bones are united by four joints:

(a) Two synovial sacroiliac joints (posterosuperolaterally).

(b) Two fibrocartilaginous joints (pubic symphysis anteroinferiorly and sacrococcygeal joint posteroinferiorly).

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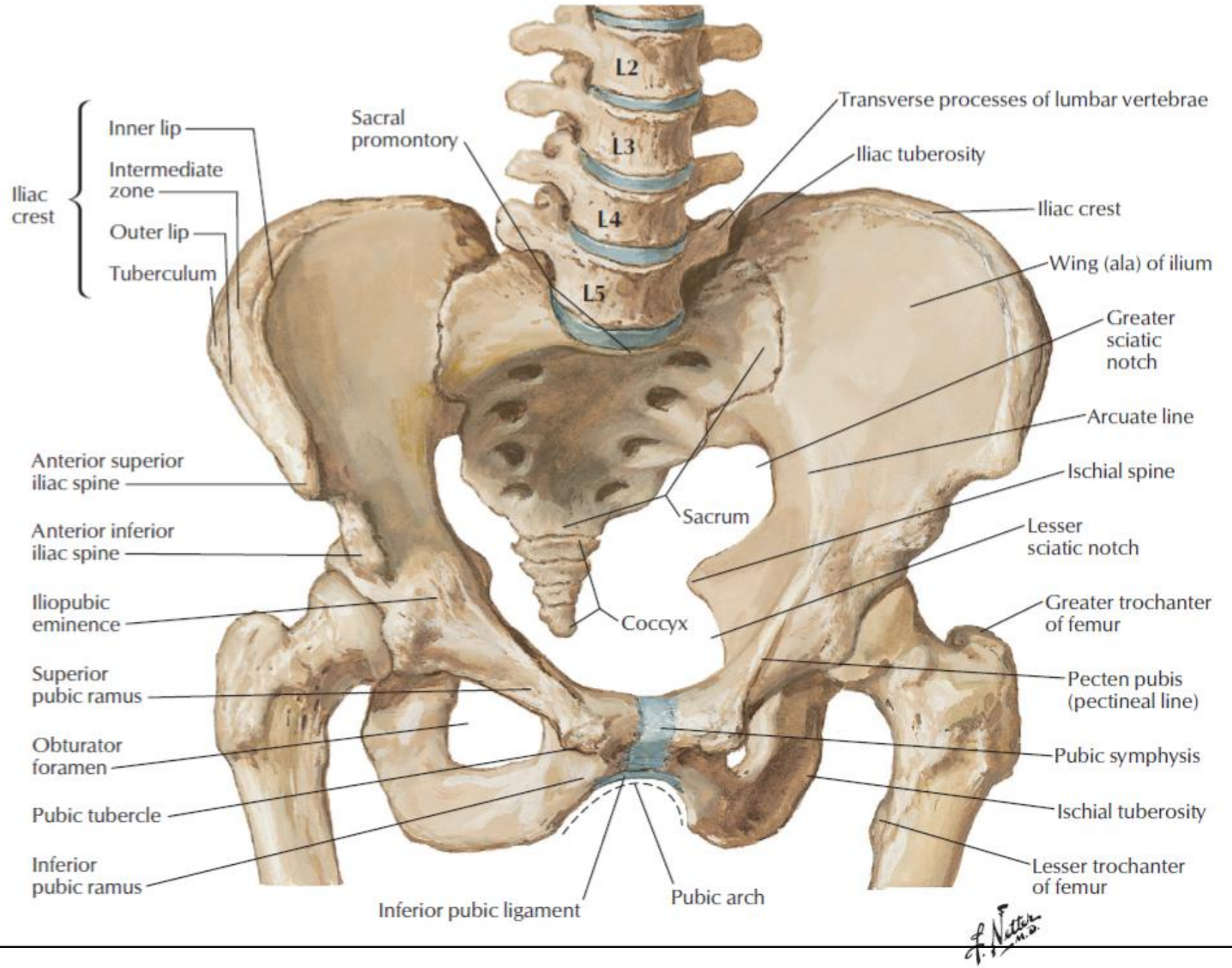

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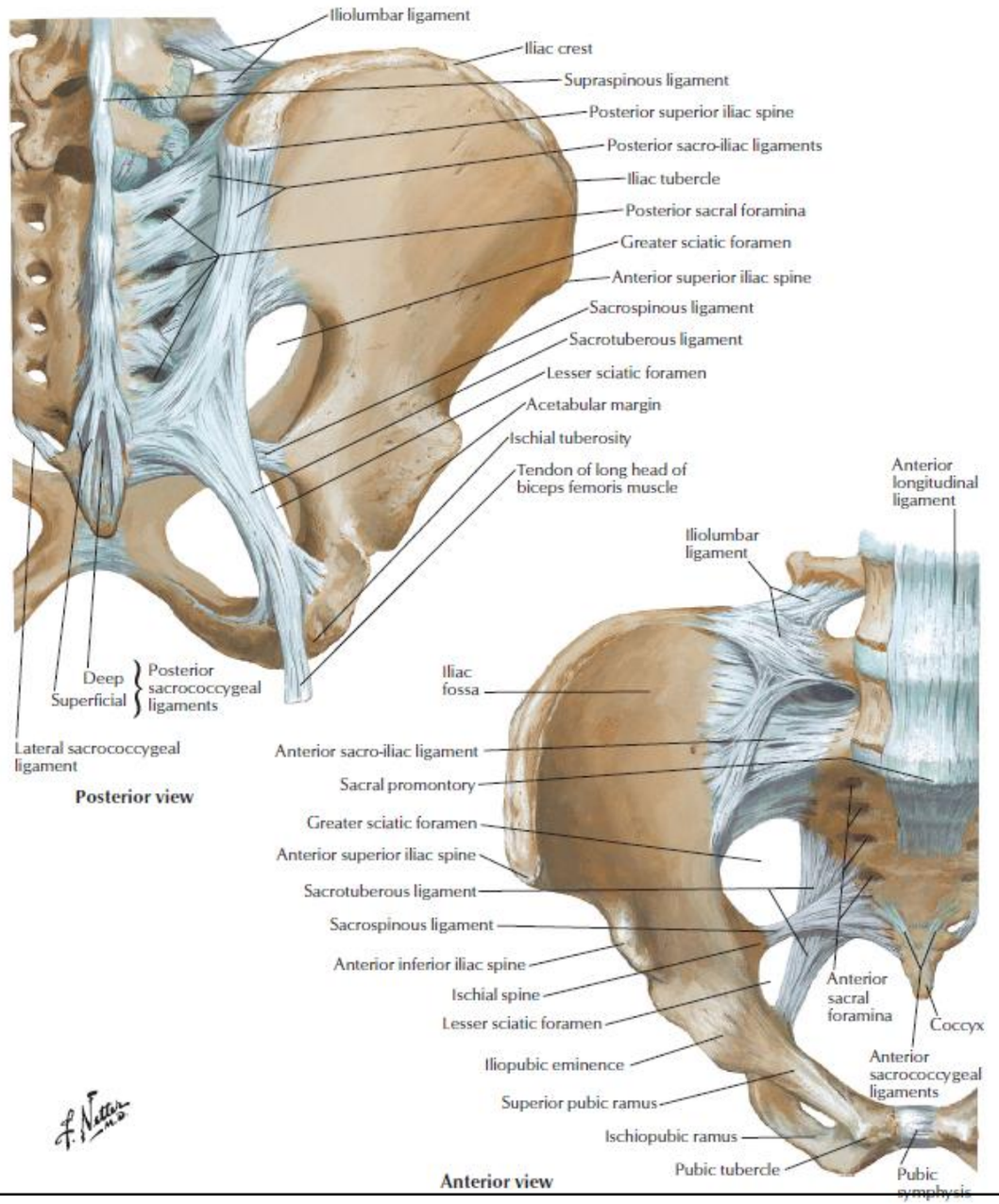

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Functions of Pelvis

1)It contains the pelvic viscera and protects them.

2)It supports the weight of the body and transmits it to the lower limbs.

3)During walking the pelvis swings from side to side by rotatory movements at the lumbosacral articulation.

4)It provides attachments for muscles.

5)In the female, it provides bony support for the birth canal.

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PARTS

-The pelvis is divided into two parts: greater pelvis and lesser pelvis by the pelvic inlet (superior pelvic aperture).

-The pelvic inlet (also called pelvic brim) is bounded:

a) Posteriorly by sacral promontory.

b)Anteriorly by upper margin of the pubic symphysis.

c)On either side by linea terminalis which includes anterior margin of ala of sacrum, arcuate line, pectin pubis/pectineal line, and pubic crest.

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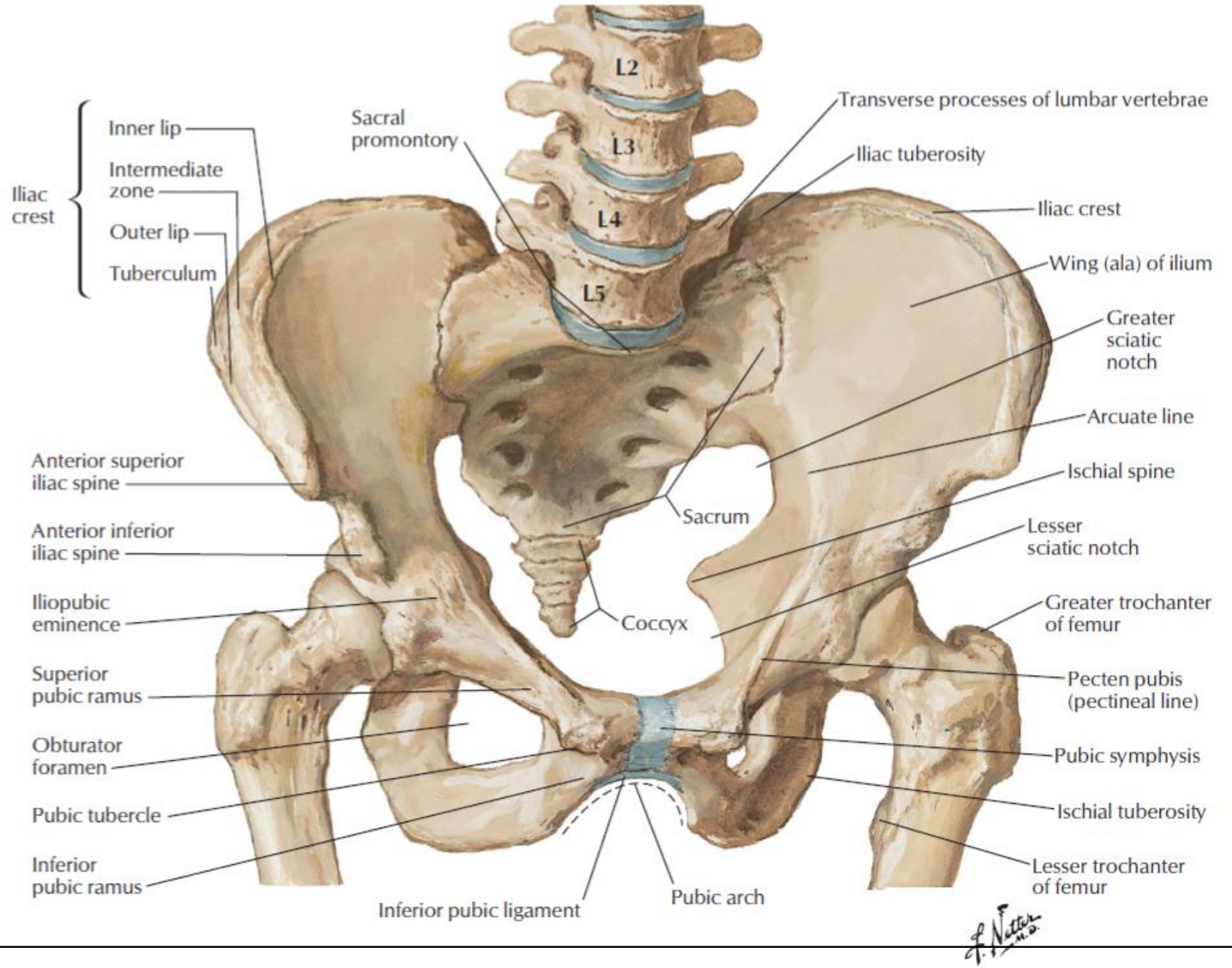

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GREATER PELVIS(FALSE PEVIS)

-It is the part of the pelvis above the pelvic brim and is formed by two iliac fossae.

-The greater pelvis forms a part of posterior abdominal wall, and contains sigmoid colon and coils of ilium.

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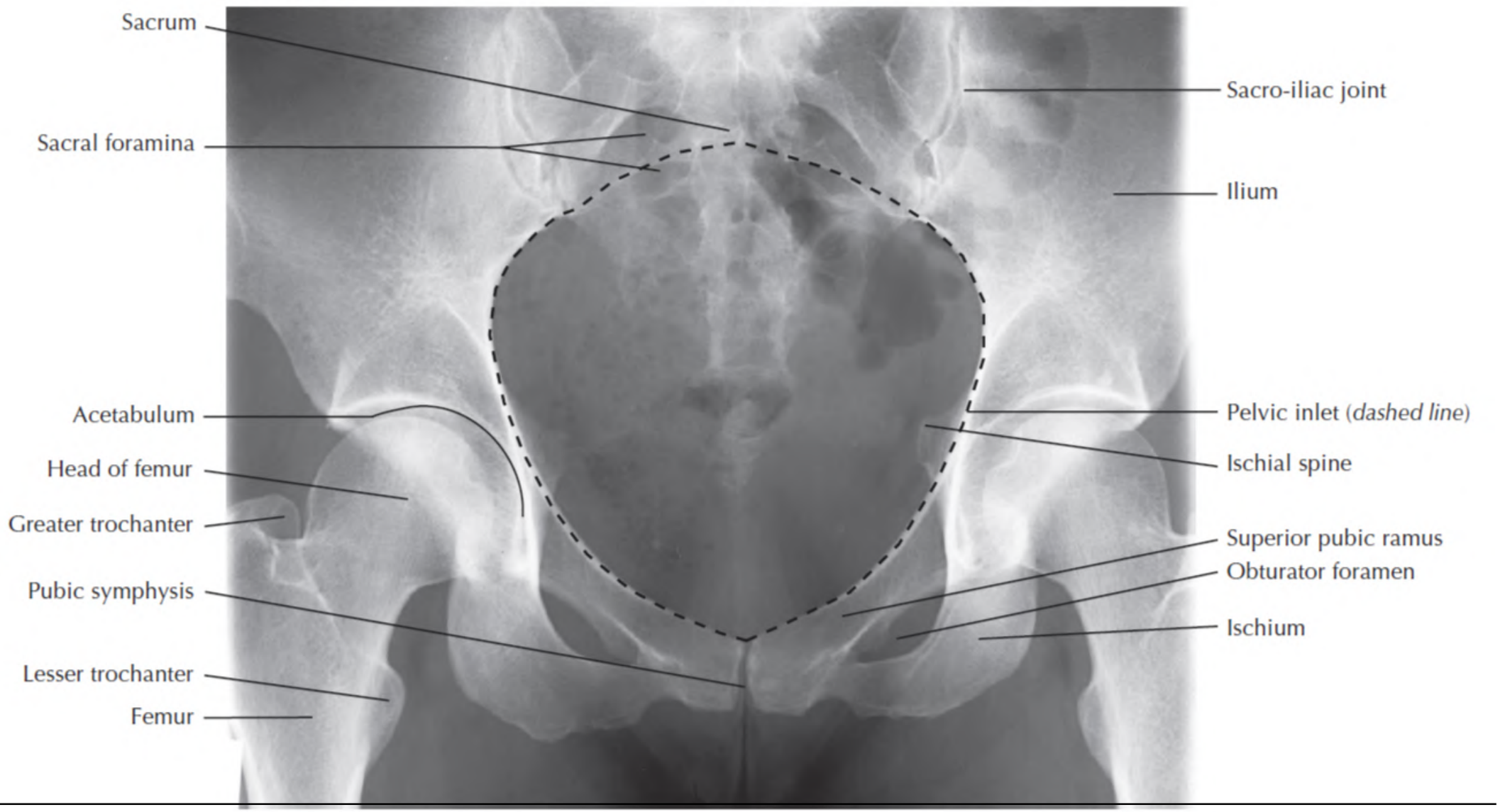
Female Pelvis



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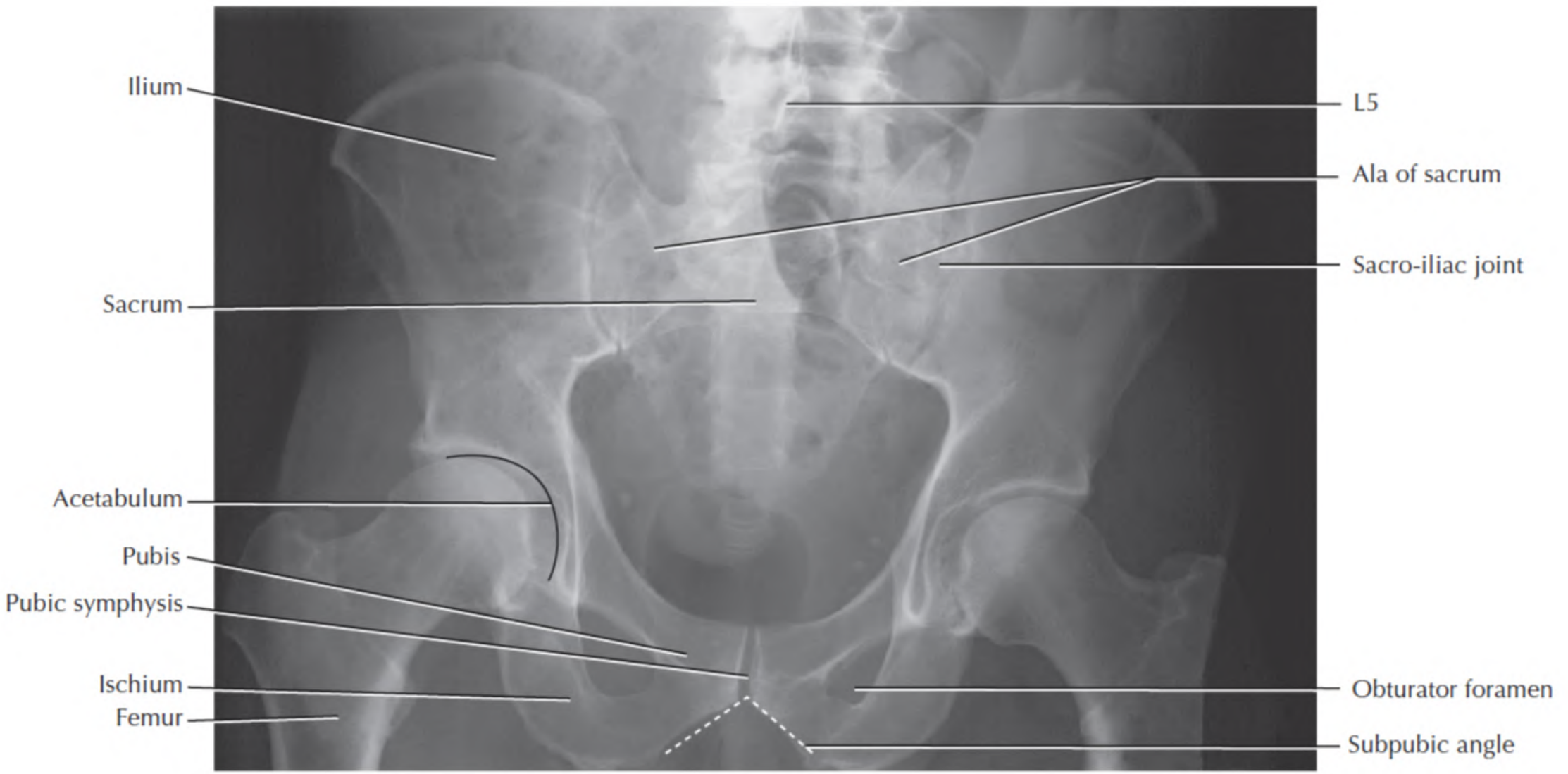
Male Pelvis



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Features	Male	Female
False pelvis	Narrow and deep	Wide and shallow
Pelvic inlet	Heart shaped	Transversely oval
True pelvis (pelvic cavity)	Narrow and deep	Roomy and shallow
Sacrum	Long and narrow with smoothly curved pelvic surface	Short and wide with abruptly curved pelvic surface near lower end
Subpubic angle	Narrow (70°)	Wide (90°–100°)

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LESSER PELVIS(TRUE PELVIS)

-The true pelvis is a bowl-shaped structure formed from the sacrum, pubis, ilium, ischium, the ligaments that interconnect these bones, and the muscles that line their inner surfaces.

-The true pelvis is considered to start at the level of the plane passing through the promontory of the sacrum, the arcuate line on the ilium, the iliopectineal line and the posterior surface of the pubic crest.

-The ‘outlet’ of the true pelvis is formed by the ischiopubic rami, ischial tuberosities, sacrotuberous ligaments and distal sacrum.

-In the female, it constitutes the birth canal.

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Regions of the true pelvis

-The true pelvis presents the pelvic inlet, pelvic outlet, and pelvic cavity.

Boundaries of the Pelvic Inlet

Posteriorly: Sacral promontory and anterior margins of alae of the sacrum.

Laterally: Arcuate and pectineal lines.

In front: Upper margin of pubic symphysis and pubic crests

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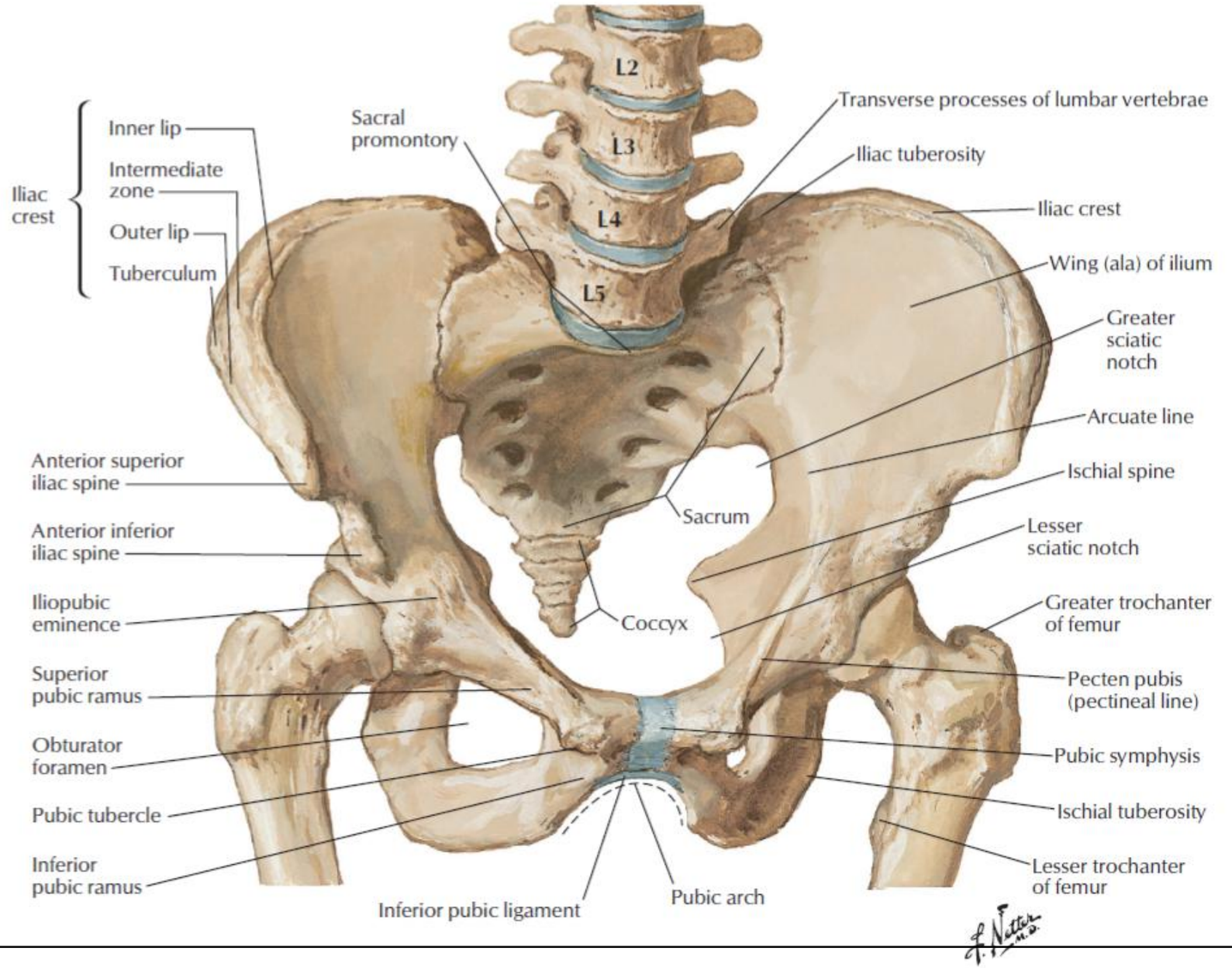

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Boundaries of the Pelvic Outlet

Anteriorly: Lower margin of the pubic symphysis.

Anterolaterally: Conjoint ischiopubic ramus on each side.

Laterally: Ischial tuberosity on each side.

Posterolaterally: Sacrotuberous ligament on each side.

Posteriorly: Tip of the coccyx.

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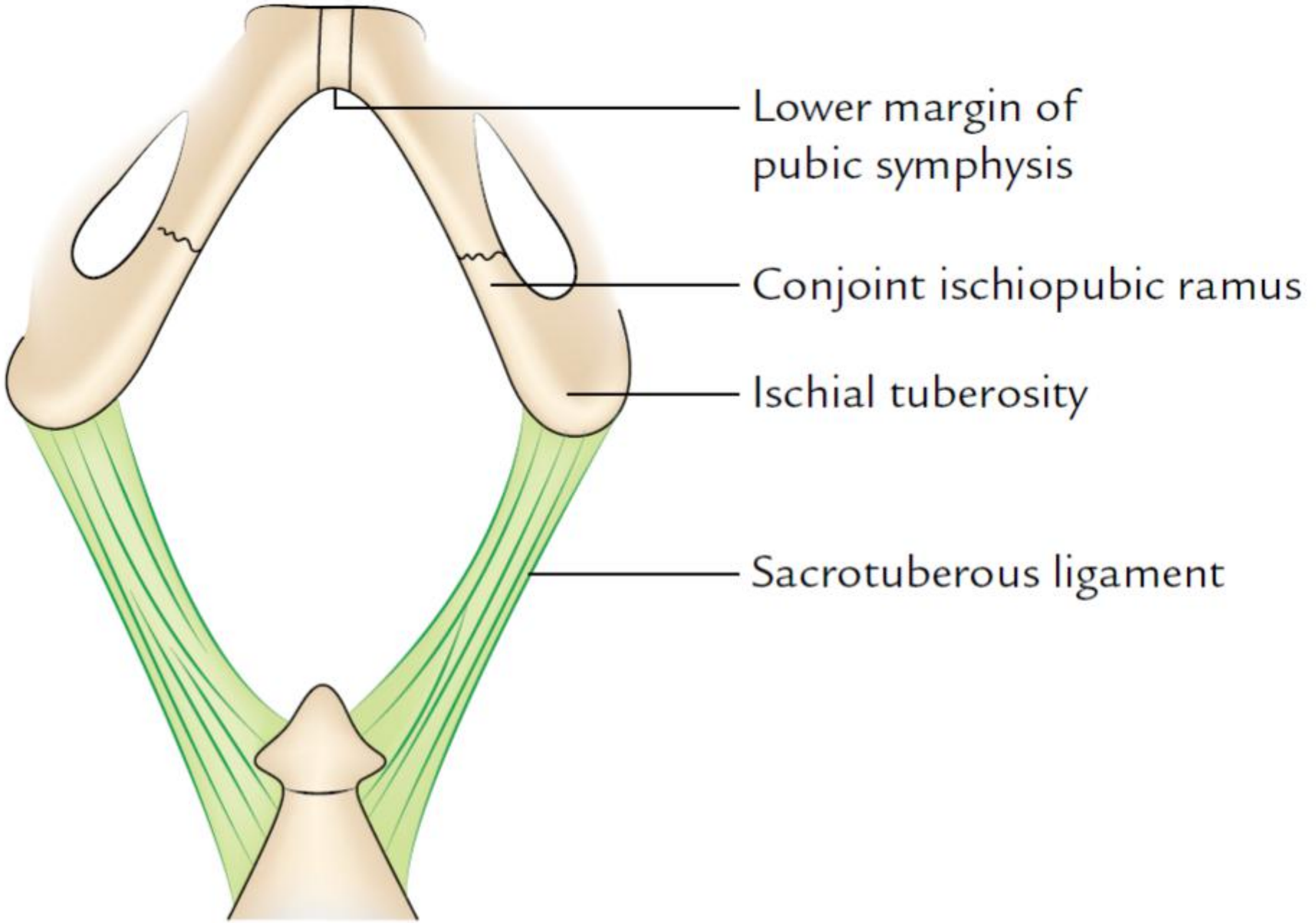

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Boundaries of the Pelvic Cavity

Anteriorly: Pelvic surfaces of the bodies of pubic bone,pubic rami, and pubic symphysis.

Posteriorly: Pelvic surfaces of the sacrum and coccyx.

Laterally: Pelvic surfaces of the ilium, ischium below the arcuate line.

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Types of the Female Pelvis

The four types of the female pelvis have been described:

1. Gynecoid.
2. Android.
3. Platypelloid.
4. Anthropoid.

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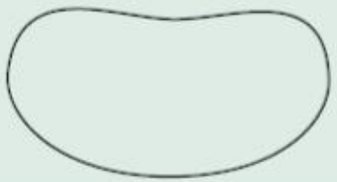
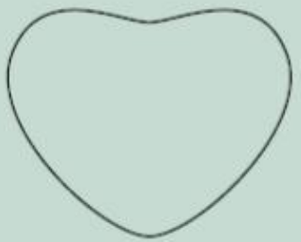
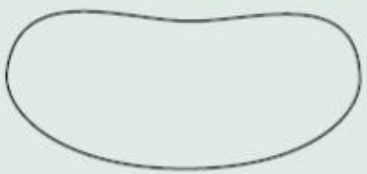
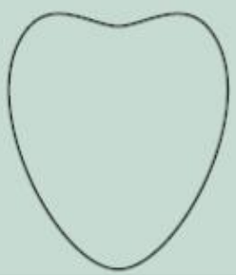
Type	Features
Gynecoid—normal (42%) 	• Inlet is transversely oval (transverse diameter is more than anteroposterior diameter) • Spacious roomy pelvic cavity • Suitable for easy passage of the baby during delivery
Android—male type (32%) 	• Inlet is heart-shaped (anteroposterior diameter is more than transverse diameter) • Pelvic cavity is funnel-shaped • Outlet reduced in all diameters • May result in obstructed labor
Platypelloid—flat pelvis (2.5%) 	• Inlet is anteroposteriorly compressed (transverse diameter is much greater than the anteroposterior diameter) • Poses difficulty in delivery
Anthropoid—ape type (23.5%) 	• Inlet is compressed from side-to-side (anteroposterior diameter is much greater than the transverse diameter) • Poses difficulty in smooth delivery

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PELVIC WALLS AND ASSOCIATED SOFT TISSUE STRUCTURES.

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INTRODUCTION

The walls of pelvis are formed by the bones and ligaments which are partly clothed by the muscles covered with fascia and parietal peritoneum.

The pelvis presents five walls:

1)Anterior wall.

2)Posterior wall.

3)Two lateral walls (right and left).

4)Inferior wall (or pelvic floor).

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Anterior Wall

-The anterior wall is the shallowest wall and is formed by the pelvic surfaces of the bodies of the pubic bone, the pubic rami, and the pubic symphysis.

Posterior Wall

-The posterior wall is extensive and is formed by the pelvic surfaces of the sacrum and coccyx. It is lined by the piriformis muscles with their covering fascia.

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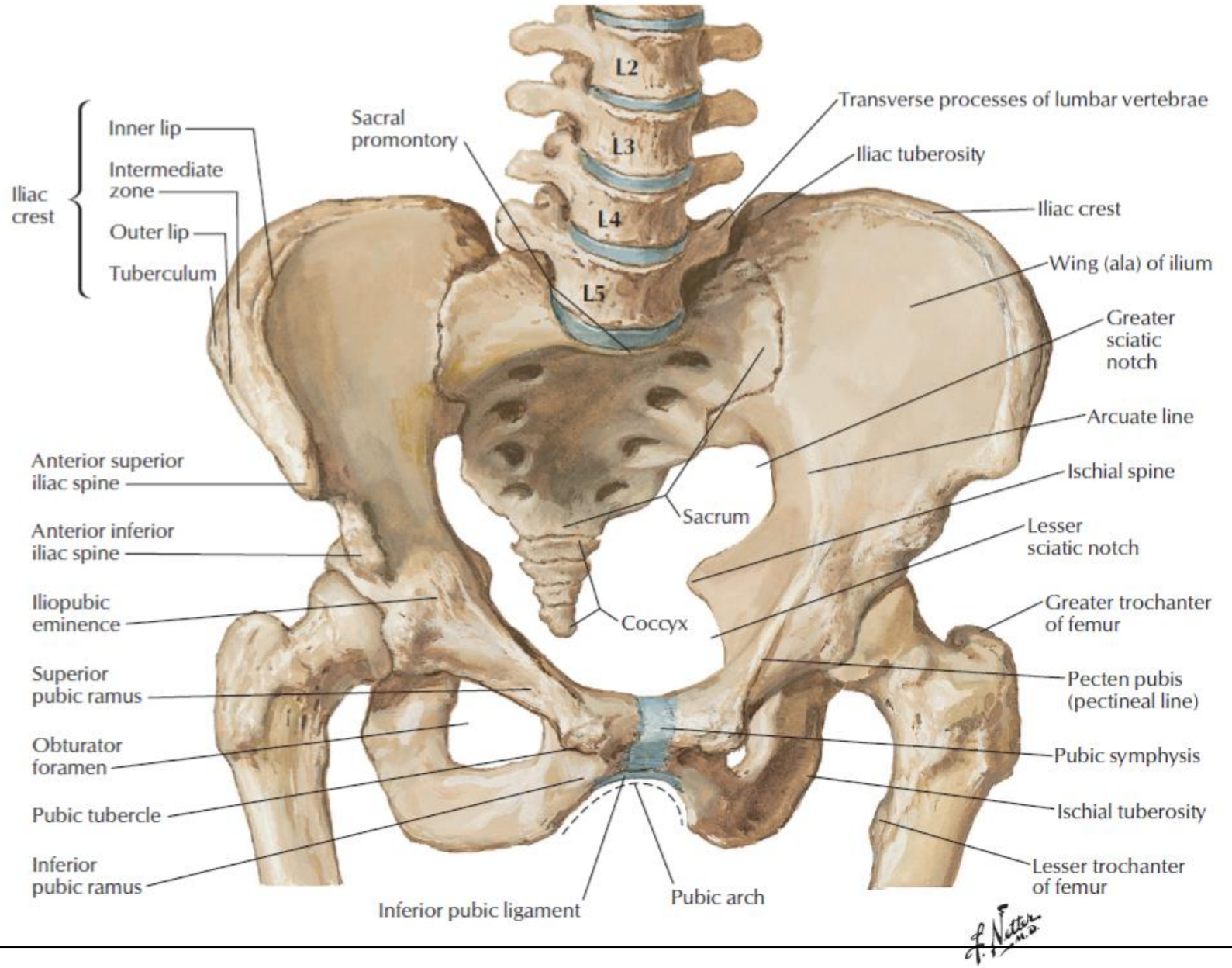

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Lateral Wall

-The lateral wall is formed by the pelvic surface of the hip bone below the pelvic inlet, the obturator membrane, the sacrotuberous and sacrospinous ligaments, and the obturator internus muscle with its covering fascia.

Inferior Wall (or Pelvic Floor)

-The inferior wall is formed by the pelvic diaphragm, which in turn is formed by the levator ani and coccygeus muscles with their covering fasciae.

-The pelvic diaphragm stretches across the true pelvis and divides it into the main pelvic cavity above and the perineum below.

-The floor of the pelvic cavity supports the pelvic viscera.

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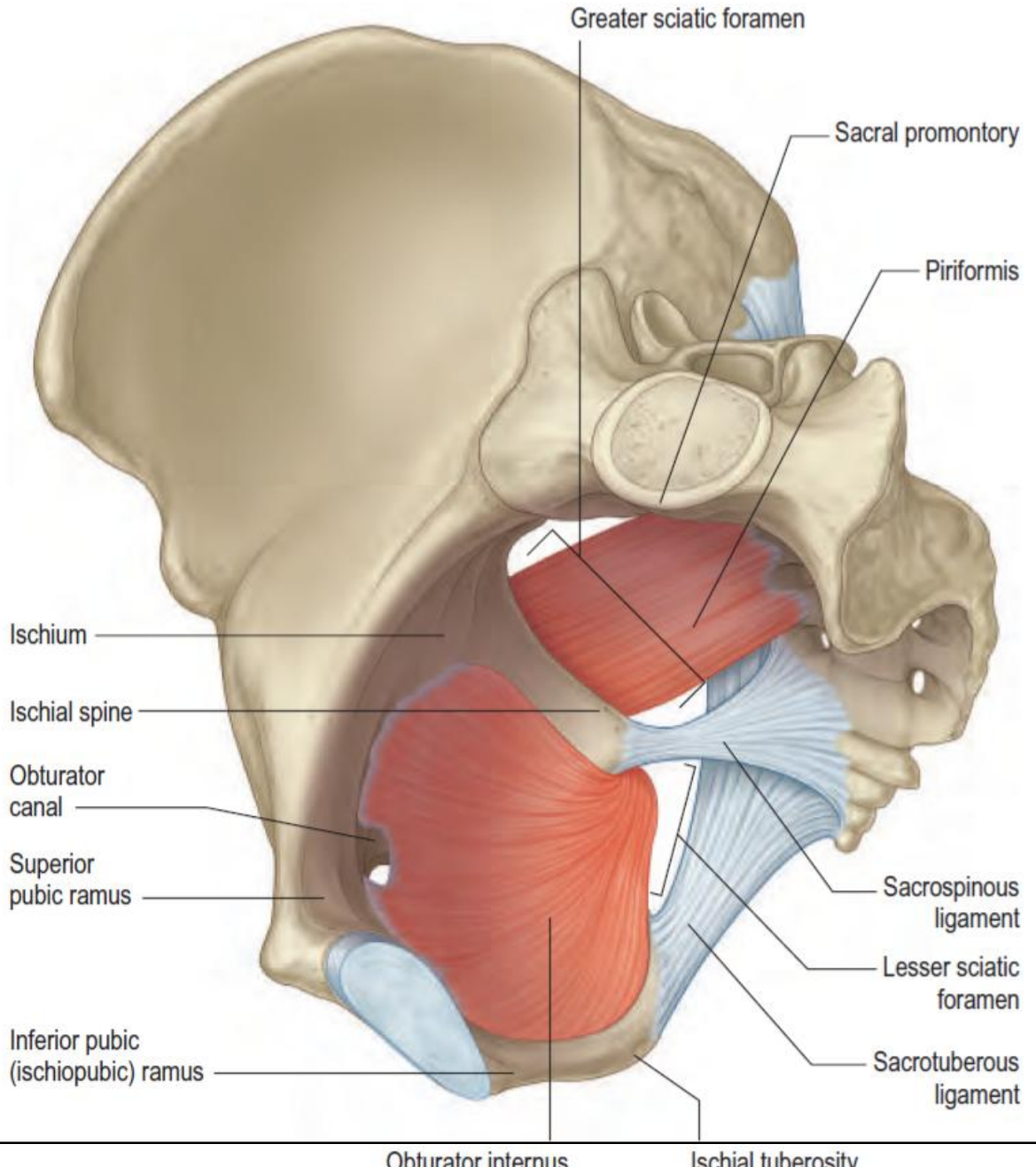

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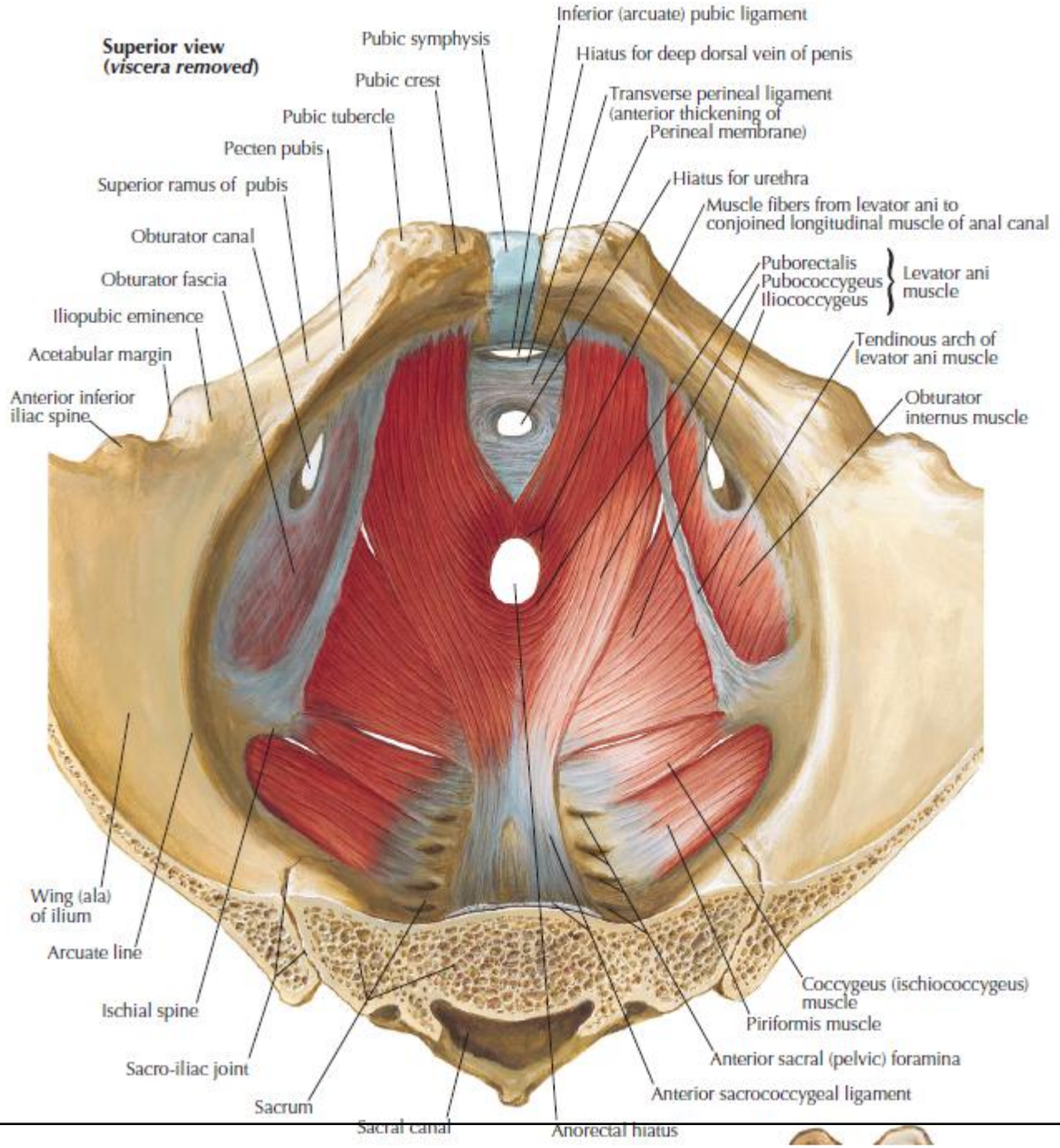

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The soft tissue structures on the pelvic walls from deep to superficial, are arranged as follows :

1. Muscles.
2. Nerves.
3. Pelvic fascia.
4. Blood vessels.
5. Peritoneum.

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MUSCLES OF THE PELVIS

The muscles of the pelvis are:

1.Obturator internus.

2.Piriformis.

3.Levator ani.

4.Coccygeus.

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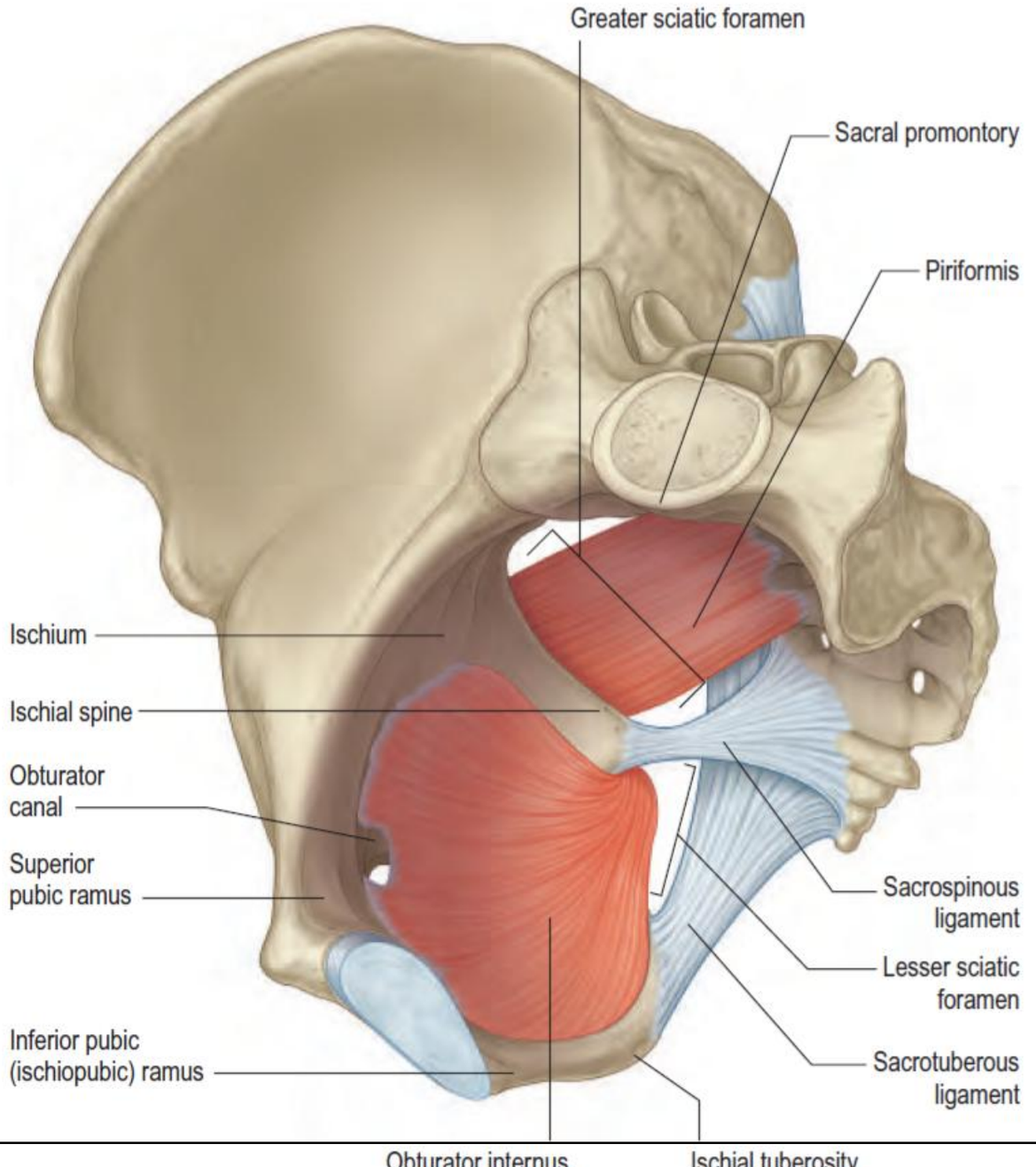

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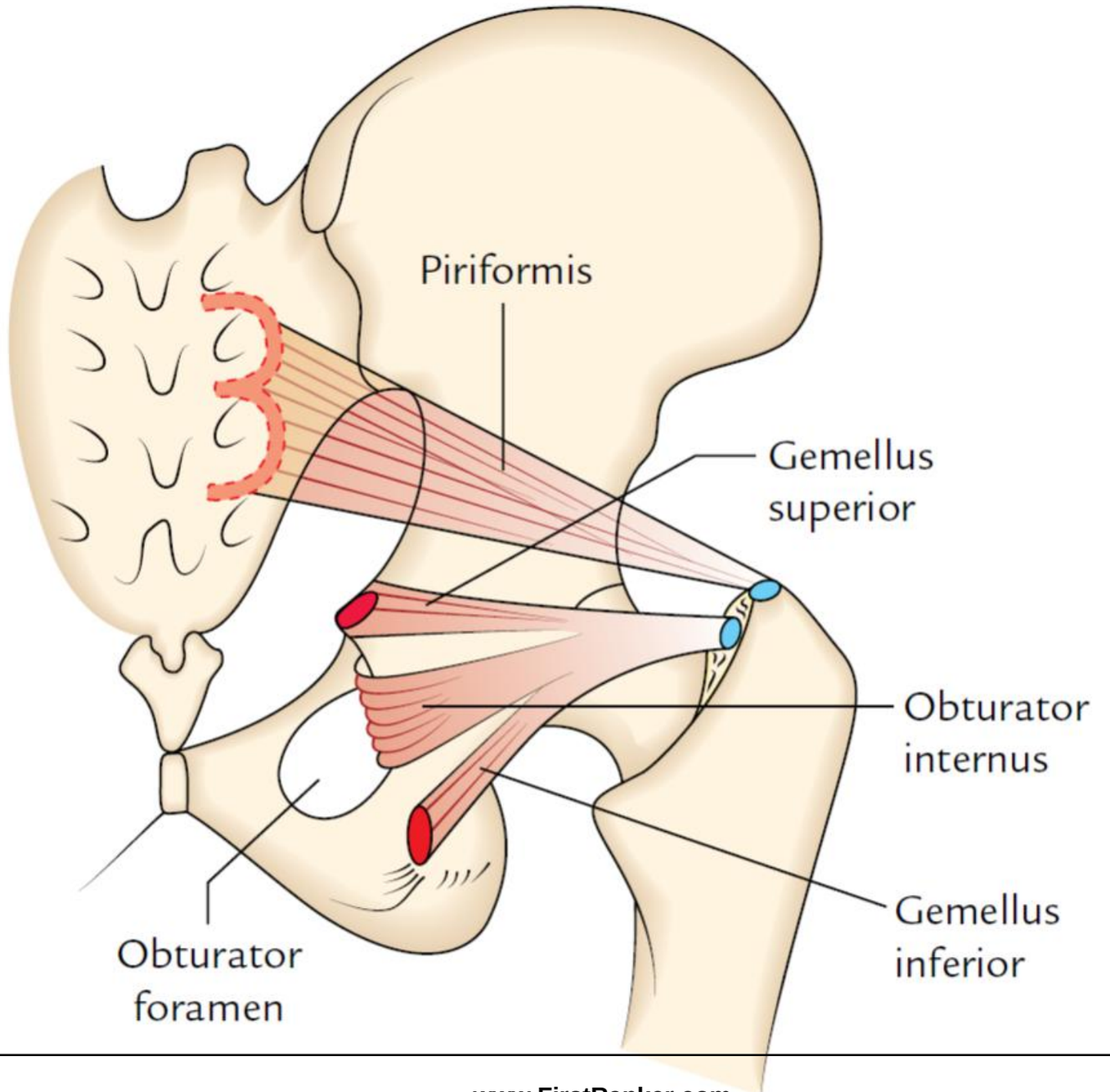

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LEVATOR ANI(Pubococcygeus,iliococcygeus and puborectalis)

-Levator ani is a broad muscular sheet of variable thickness attached to the internal surface of the pelvis. It forms a large portion of the pelvic floor .

-The muscle is subdivided into named portions according to their attachments and the pelvic viscera to which they are related (pubococcygeus, iliococcygeus and puborectalis).

-These parts are often referred to as separate muscles but the boundaries between each part cannot be easily distinguished and, moreover, they perform many similar physiological functions.

-Levator ani arises from each side of the walls of the pelvis along the condensation of the obturator fascia (the tendinous arch of levator ani).

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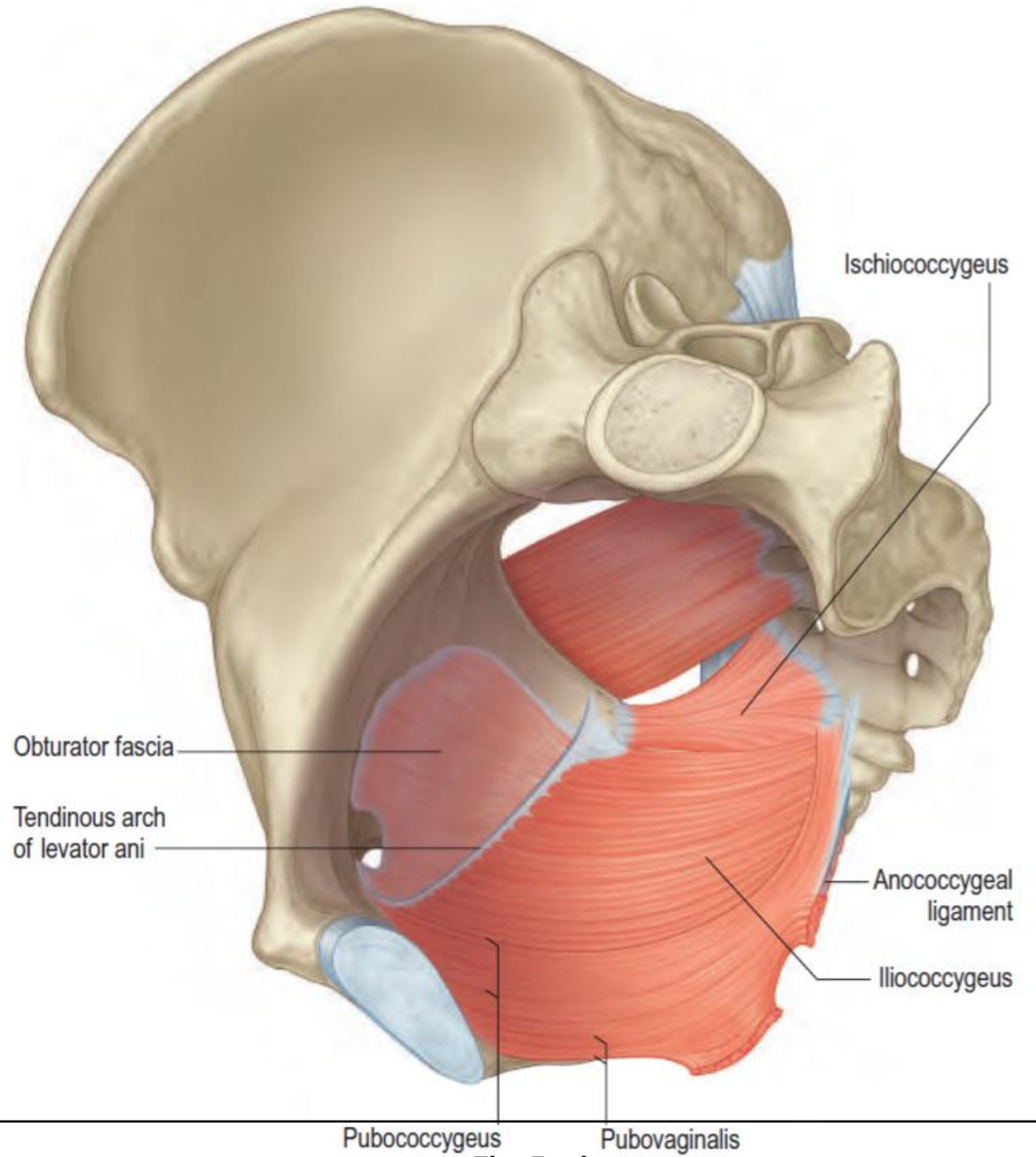

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Origin

-The levator ani muscle has a linear origin from the pelvic surface of the body of pubis, a tendinous arch of obturator fascia, and the pelvic surface of the ischial spine.

Insertion

-The groups of fibres sweep backward, downward and medially to be inserted as follows :

1. The anterior fibres form a sling around the prostate (levator prostatae) or vagina (sphincter vaginae) and are inserted into the perineal body (a mass of fibrous tissue) in front of the anal canal.

2. The intermediate fibres (puborectalis) form a sling around the anorectal junction to be inserted into the anococcygeal raphe (a fibrous raphe which extends from the anorectal junction to the tip of coccyx).

3. The posterior fibres (iliococcygeus) are inserted into the anococcygeal raphe and the coccyx.

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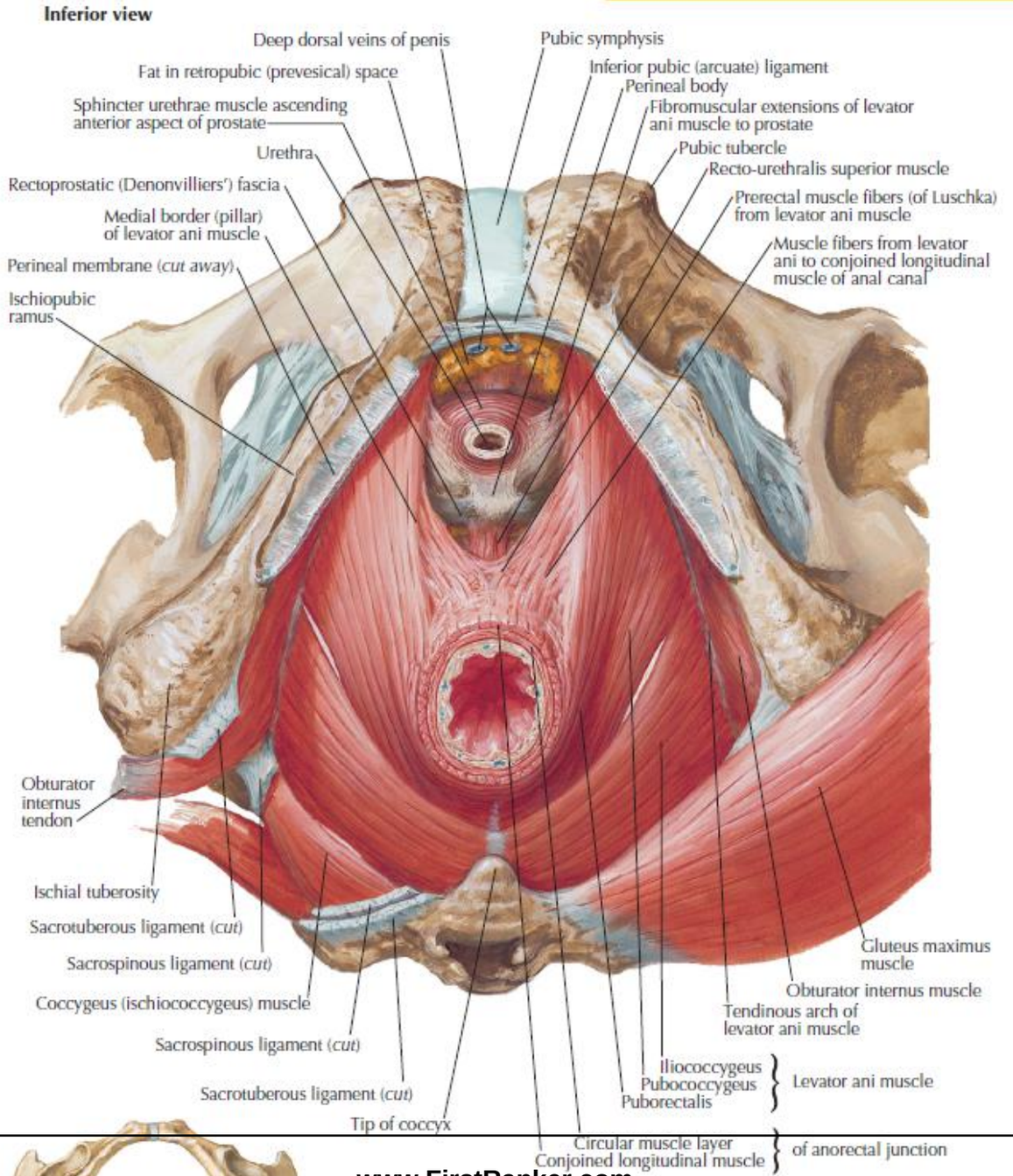

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Nerve Supply

(a) perineal branch of 4th sacral nerve.

(b) perineal branch of the pudendal nerve (S2,S3) .

Actions

1)Support the pelvic viscera and resist the intra-abdominal pressure during straining and expulsive efforts of the anterior abdominal wall muscles.

2. They also subserve a sphincteric action on the anorectal junction to maintain continence of faeces in both sexes and vagina in female.

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COCCYGEUS(ISCHIOCOCCYGEUS)

The coccygeus is a small triangular muscle situated behind the levator ani muscle .

Origin

-It arises by its apex from the pelvic surface of ischial spine and sacrospinous ligament.

Insertion

-From its base into the sides of upper two pieces of coccyx and the last piece of sacrum.

Nerve Supply

-It is by the ventral rami of 4th and 5th sacral nerves (S4, S5).

Actions

1. The coccygeus muscles assist the levator ani muscles to support the pelvic viscera.
2. They can also produce minor movements of the coccyx.

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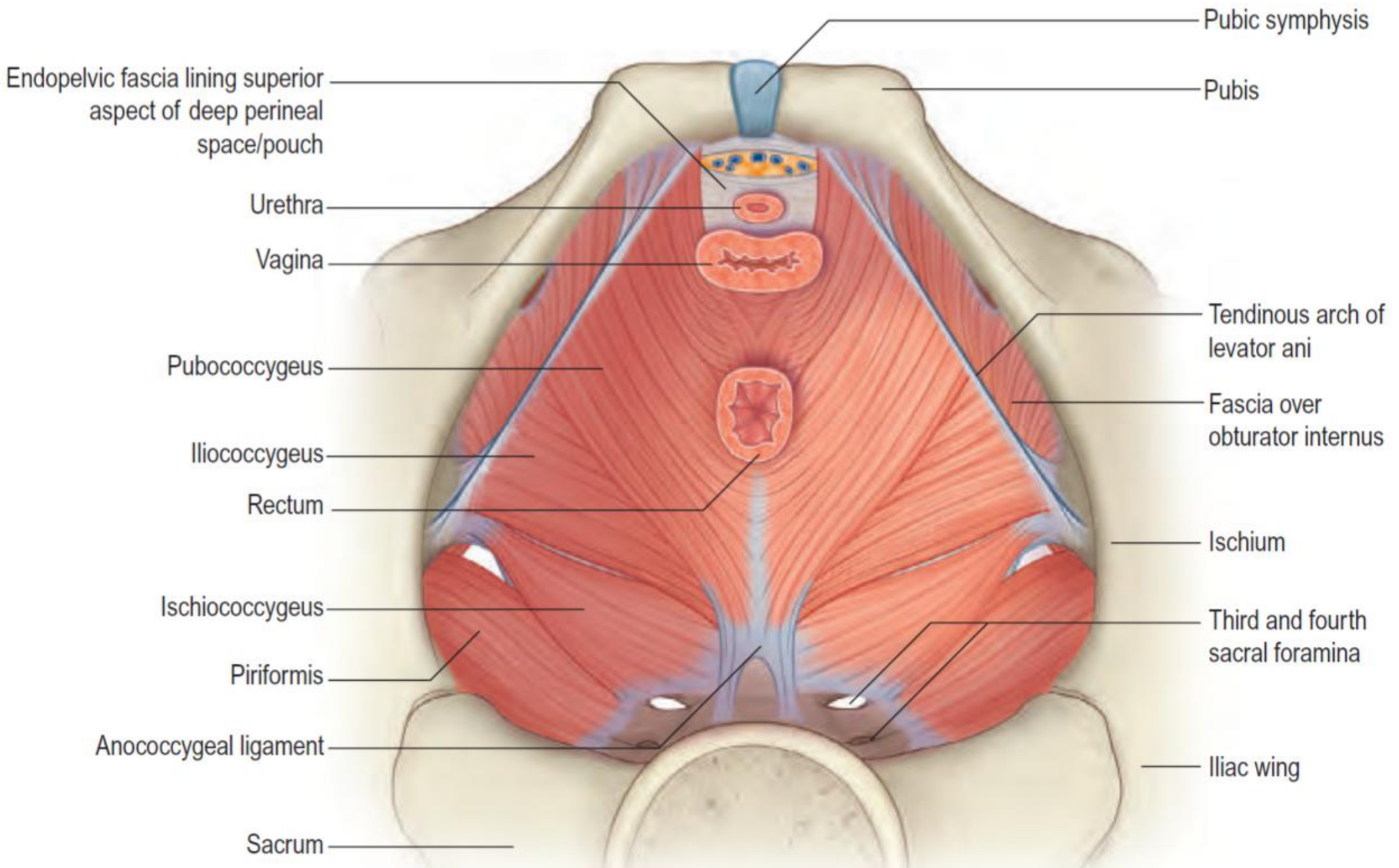

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PELVIC DIAPHRAGM

-The pelvic diaphragm is a muscular partition between the true pelvis and the perineum.

-It forms the gutter shaped pelvic floor.

-It is formed by the large levator ani and small coccygeus muscles of two sides and their covering fasciae.

- It is incomplete anteriorly to allow passage for the urethra in the males, and the urethra and vagina in the females.

Functions

-The pelvic diaphragm provides principal support to the pelvic viscera and has a sphincteric action on the rectum and vagina.

- It also assists in increasing the intra abdominal pressure during defecation, micturition, and parturition.

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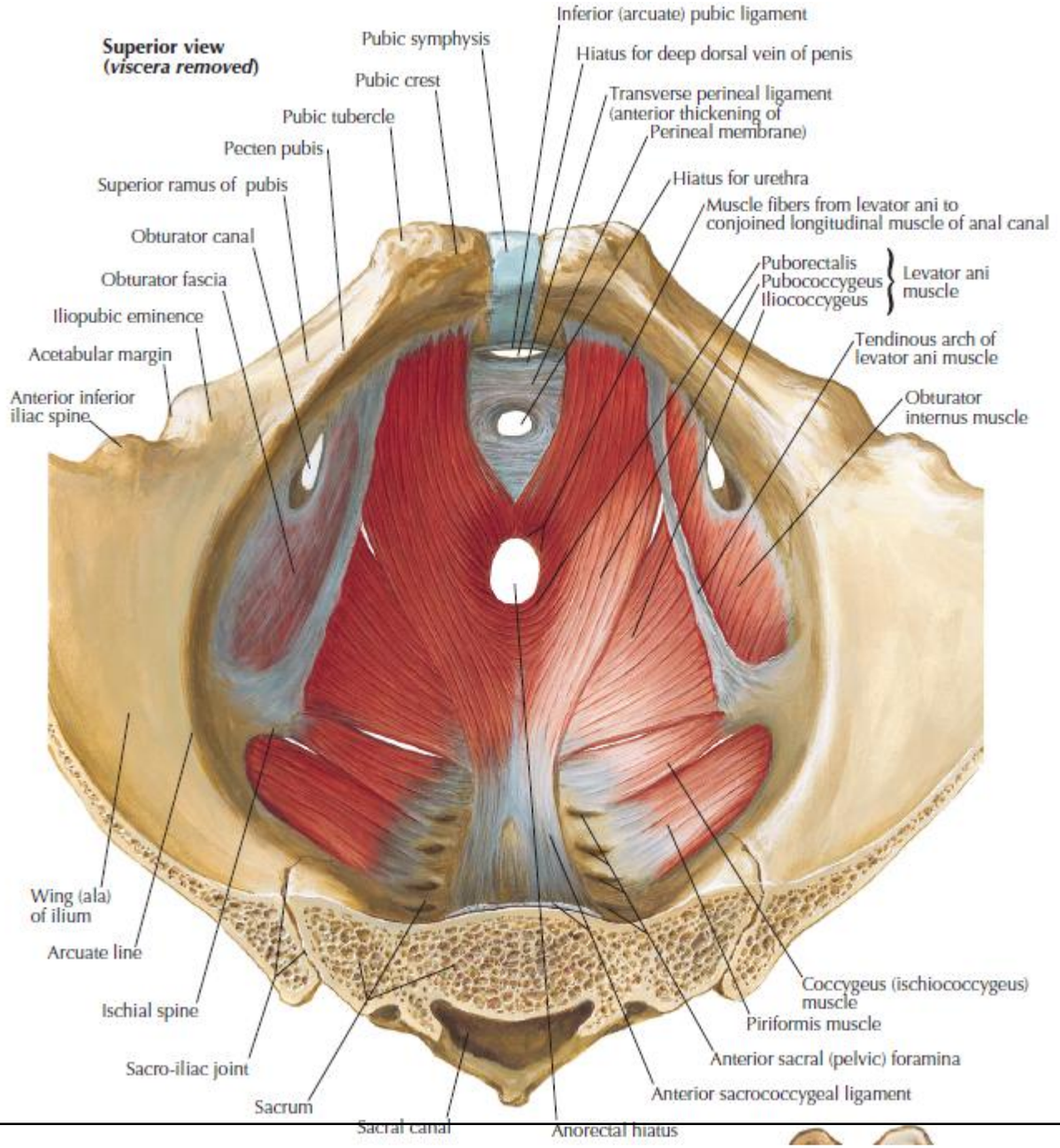

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The pelvic diaphragm presents the following openings:

1.Hiatus urogenitalis: It is a triangular gap between the anterior fibres of the two levator ani muscles. It transmits the urethra in male, and the urethra and vagina in female. The hiatus urogenitalis is closed from below by the urogenital diaphragm.

2.Hiatus rectalis: It is a round opening between the perineal body and the anococcygeal raphe. It provides passage to the anorectal junction.

Injury of pelvic diaphragm:

The pelvic diaphragm may be injured (tearing of perineal body) during difficult childbirth. As a result it becomes weak and can no longer provide sufficient support to the pelvic viscera. This may lead to uterine prolapse and rectal prolapse.

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PELVIC FASCIA

The pelvic fasciae may be conveniently divided into the parietal pelvic fascia, which forms the coverings of the pelvic muscles, and the visceral pelvic fascia, which forms the coverings of the pelvic organs and their neurovascular supply.

Parietal pelvic fascia

The parietal pelvic fascia consists of the obturator fascia, the fasciae over piriformis, and over levator ani (the pelvic diaphragm) and the presacral fascia.

Visceral pelvic fascia

It is condensation of the loose areolar tissue around the extraperitoneal parts of the pelvic viscera and blood vessels.

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NERVES OF THE PELVIS

The nerves of the true pelvis are divided into two groups—somatic nerves and autonomic nerves.

SOMATIC NERVES

The following neural structures are to be studied under this heading:

1. Lumbosacral trunk.
2. Sacral plexus.
3. Coccygeal plexus.

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LUMBOSACRAL TRUNK

It is a thick cord formed by the descending part of the ventral ramus of L4 nerve and entire ventral ramus of L5 nerve.

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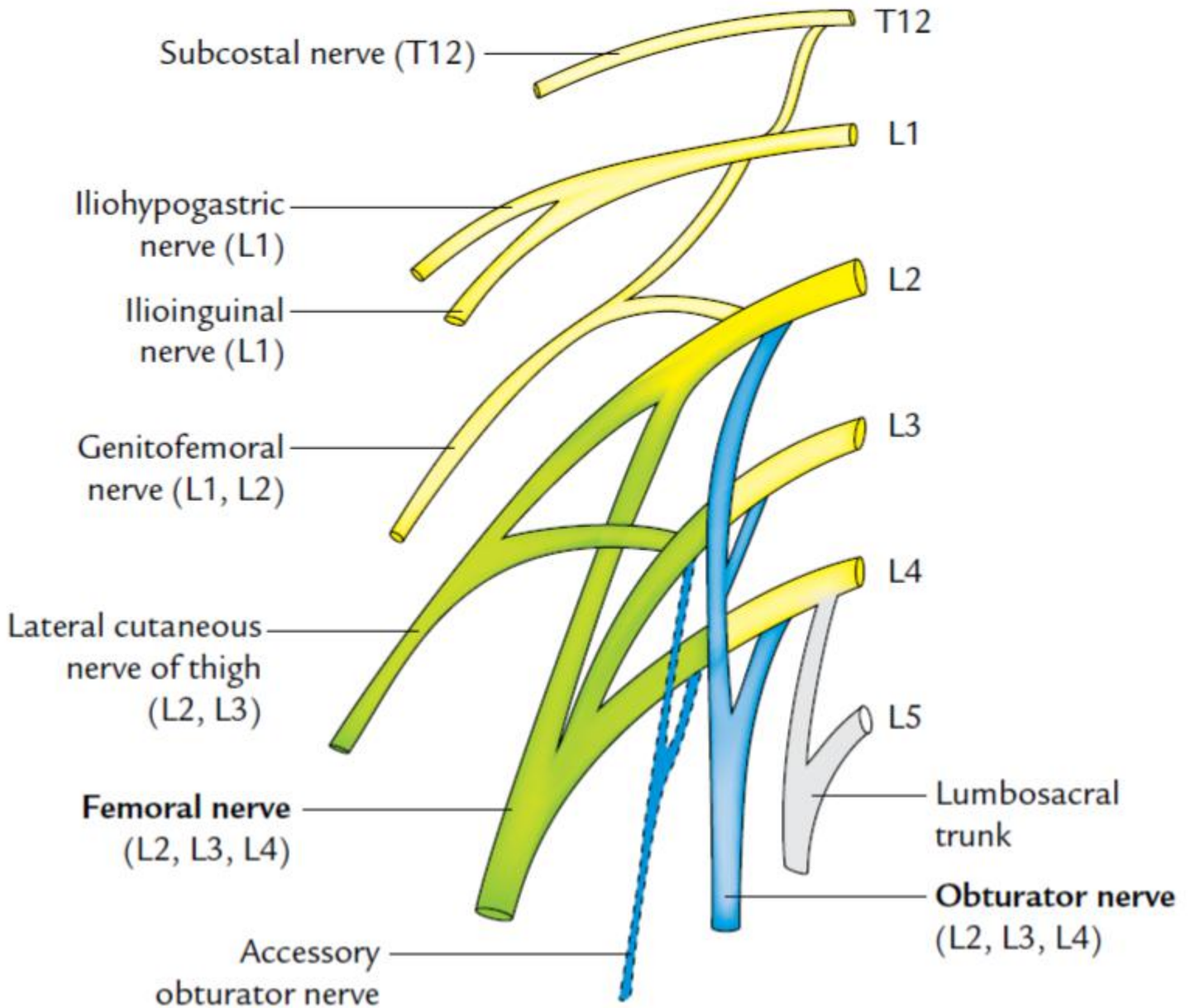

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SACRAL PLEXUS

-The sacral plexus is formed by the ventral primary rami of L4, L5; S1, S2, S3 nerves.

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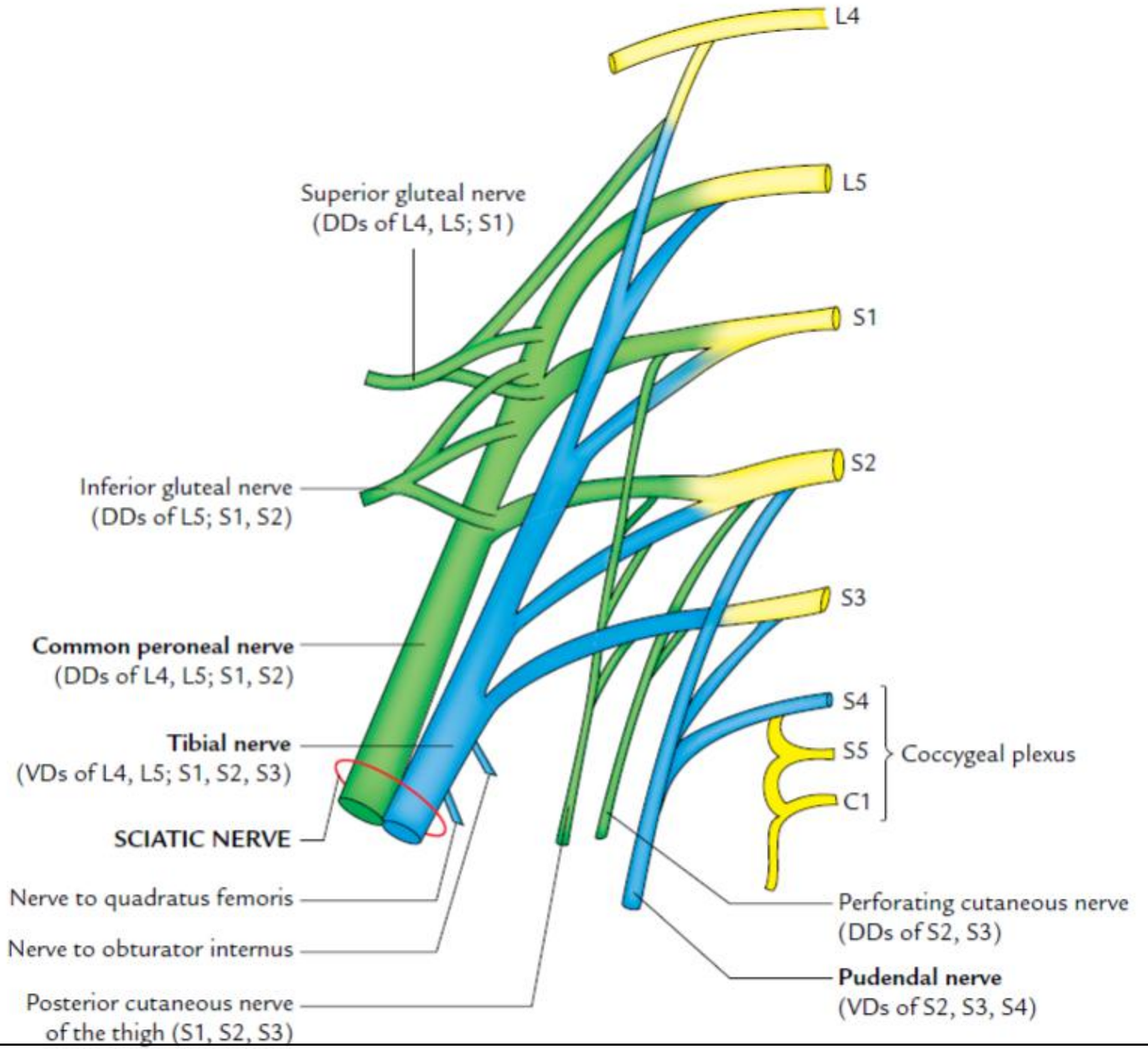

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Branches of Sacral plexus

Nerves arising from the roots of plexus

1. Muscular branches
2. Pelvic splanchnic nerves (Nervi erigentes)

Terminal branches of plexus

1. Sciatic nerve (L4, L5; S1, S2, S3): It consists of two nerves (common peroneal and tibial) enclosed in a common sheath:

(a) The common peroneal nerve is formed by the dorsal divisions of the L4, L5; S1, S2 nerves.

(b) The tibial nerve is formed by the ventral divisions of the L4, L5; S1, S2, S3 nerves.

2. Pudendal nerve (ventral division of S2, S3, S4

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Branches arising from the pelvic surface of plexus

1)Nerve to quadratus femoris (ventral divisions of L4, L5; S1)

2)Nerve to obturator internus (ventral divisions of L5; S1,S2)

Nerves arising from the dorsal surface of plexus

1)Superior gluteal nerve (dorsal divisions of L4, L5; S1)

2)Inferior gluteal nerve (dorsal divisions of L5; S1, S2)

3)Posterior cutaneous nerve of the thigh (S1, S2, and S3)

4)Perforating cutaneous nerve (dorsal divisions of S2, S3)

5)Perineal branch of fourth sacral nerve.

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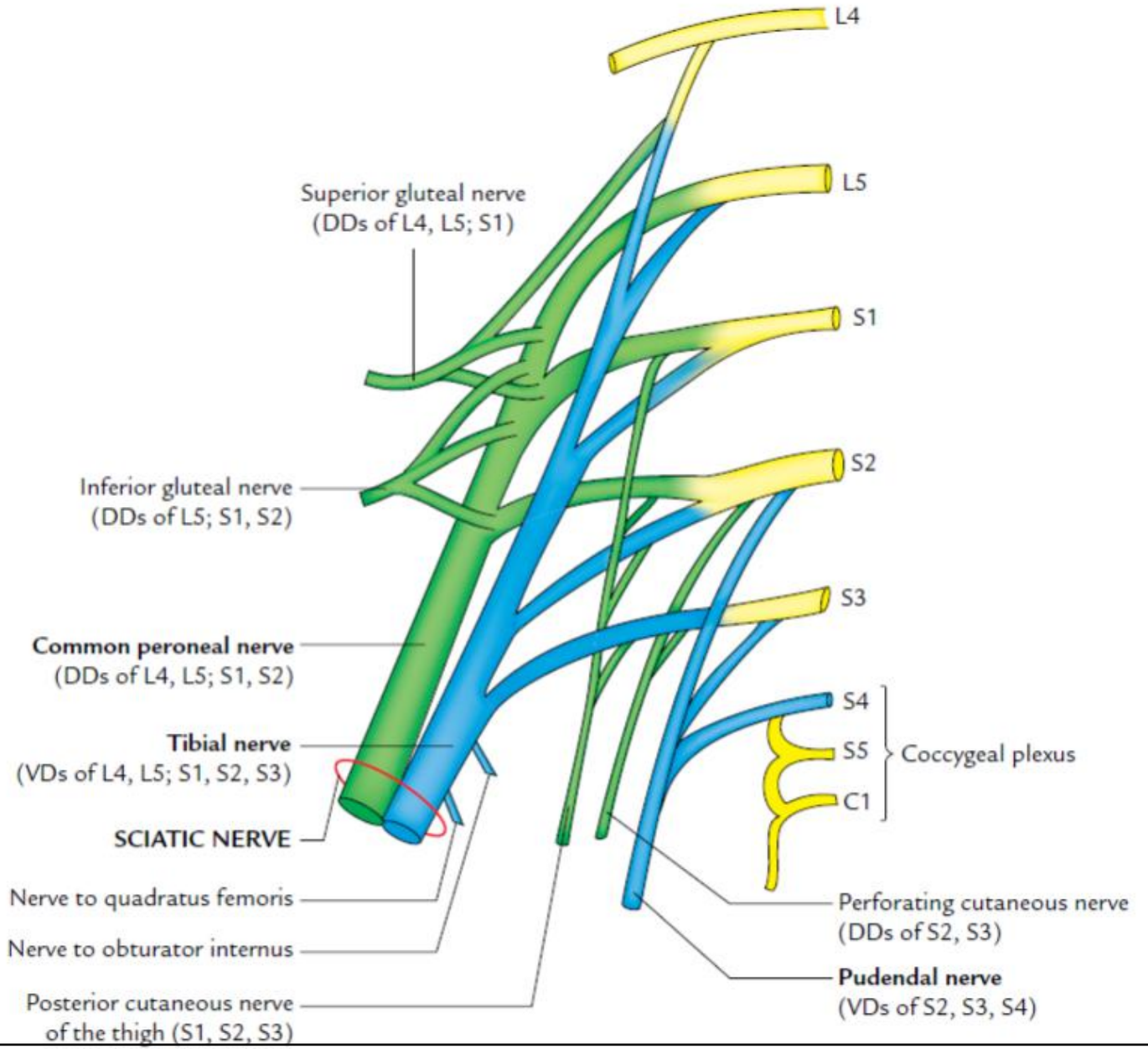

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COCCYGEAL PLEXUS

It is a small nerve plexus formed by the ventral rami of S4, S5 and coccygeal nerve.

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Vessels Of The True Pelvis

The vessels of the pelvis are:

1)Arteries (superior rectal, internal iliac, median sacral,and ovarian).

2)Veins (internal iliac, superior rectal, median sacral and ovarian veins, and pelvic venous plexuses).

3)Lymph vessels and associated lymph nodes.

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ARTERIES

A)Superior rectal artery

-It is the continuation of inferior mesenteric artery.

B)Internal iliac artery

-At the upper margin of the greater sciatic foramen,it divides into anterior and posterior division.

Branches of the Anterior Division

1)Superior vesical artery

2)Obturator artery

3)Inferior vesical artery(vaginal artery in female)

4)Middle rectal artery

5)Internal pudendal artery

6)Inferior gluteal artery

7)Uterine artery

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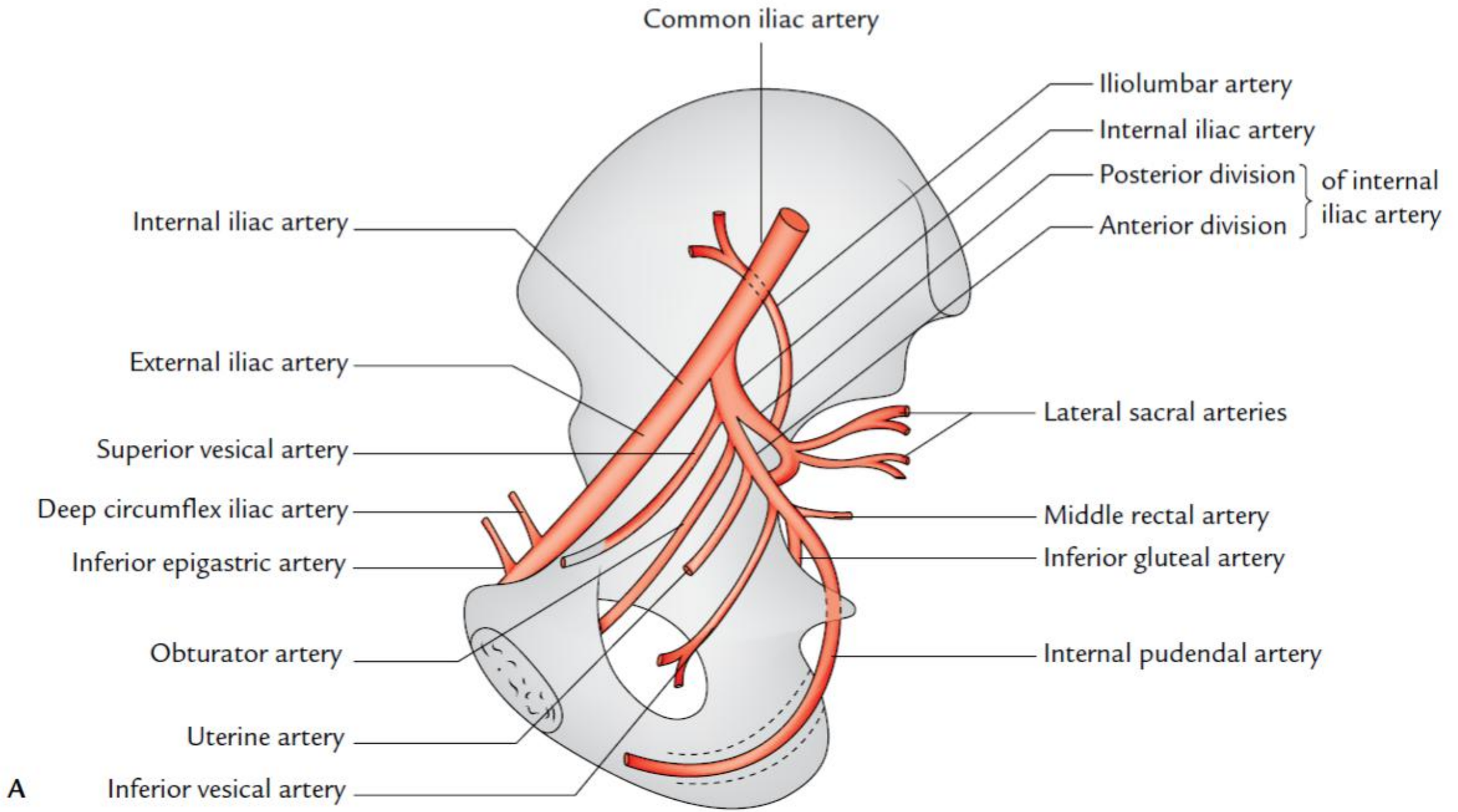

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Branches of the Posterior DIVISION

1)Iliolumbar artery

2)Lateral sacral artery

3)Superior gluteal artery

C)Median Sacral Artery

D)Ovarian Artery

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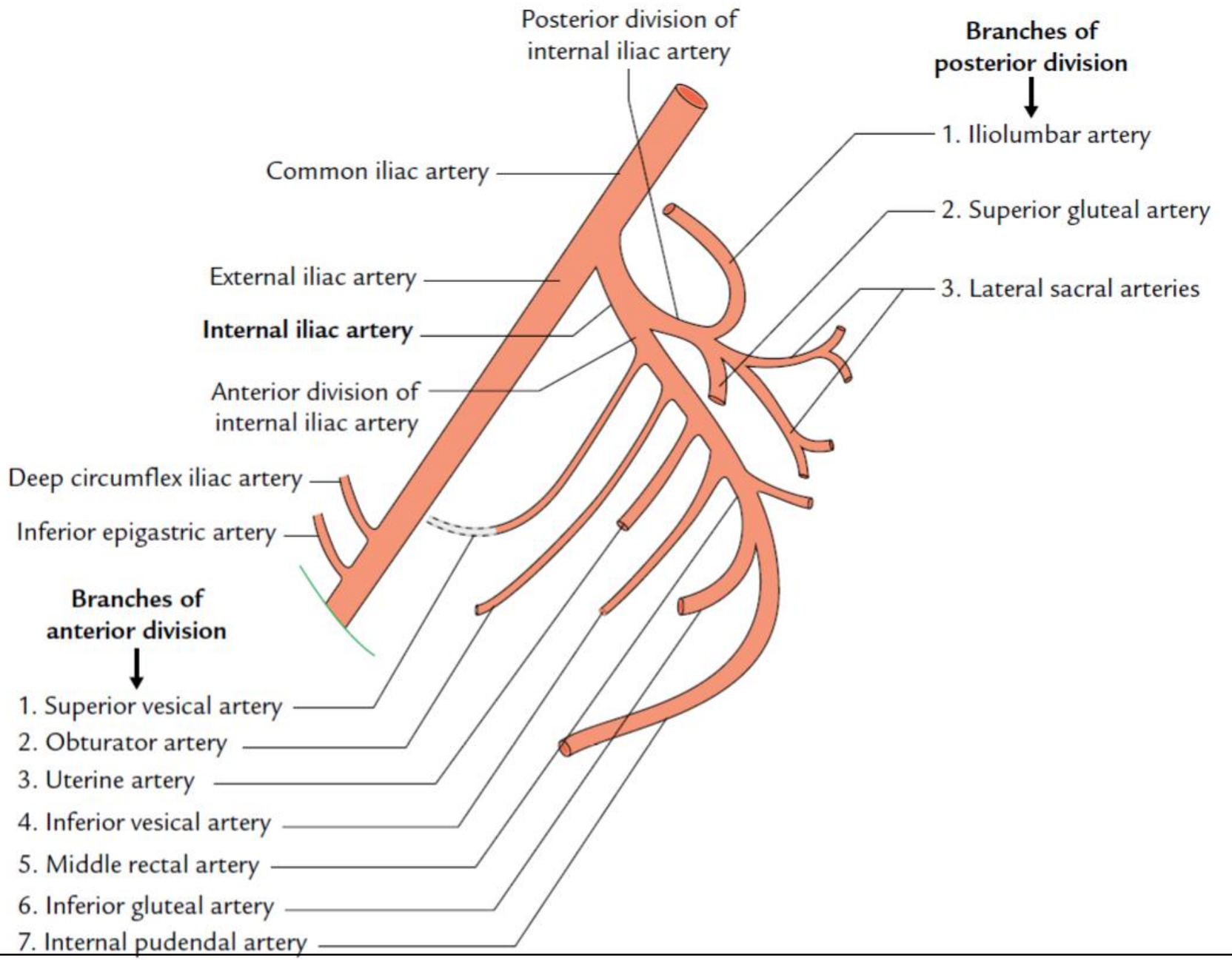

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