AVASCULAR PELVIC SPACES

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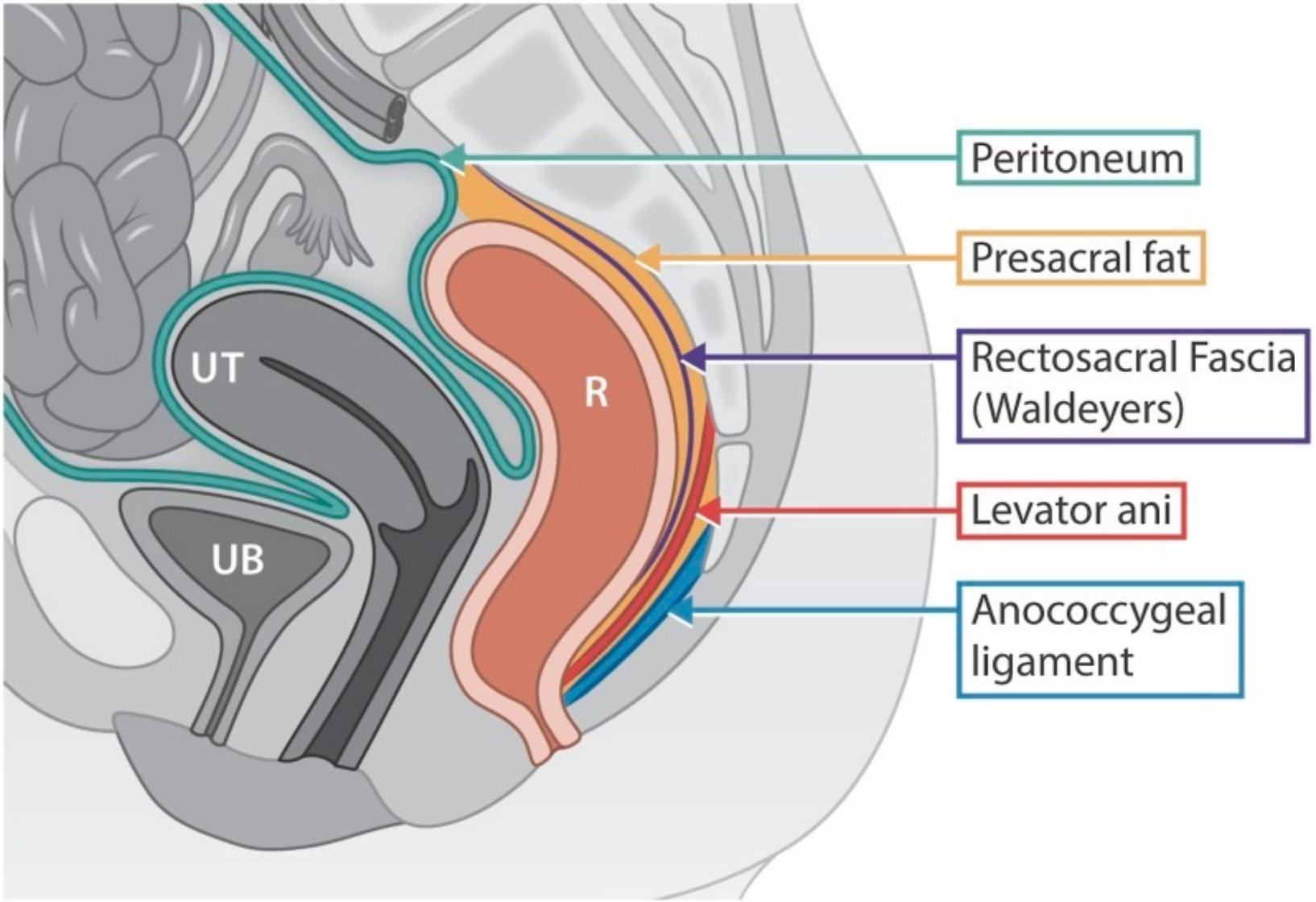
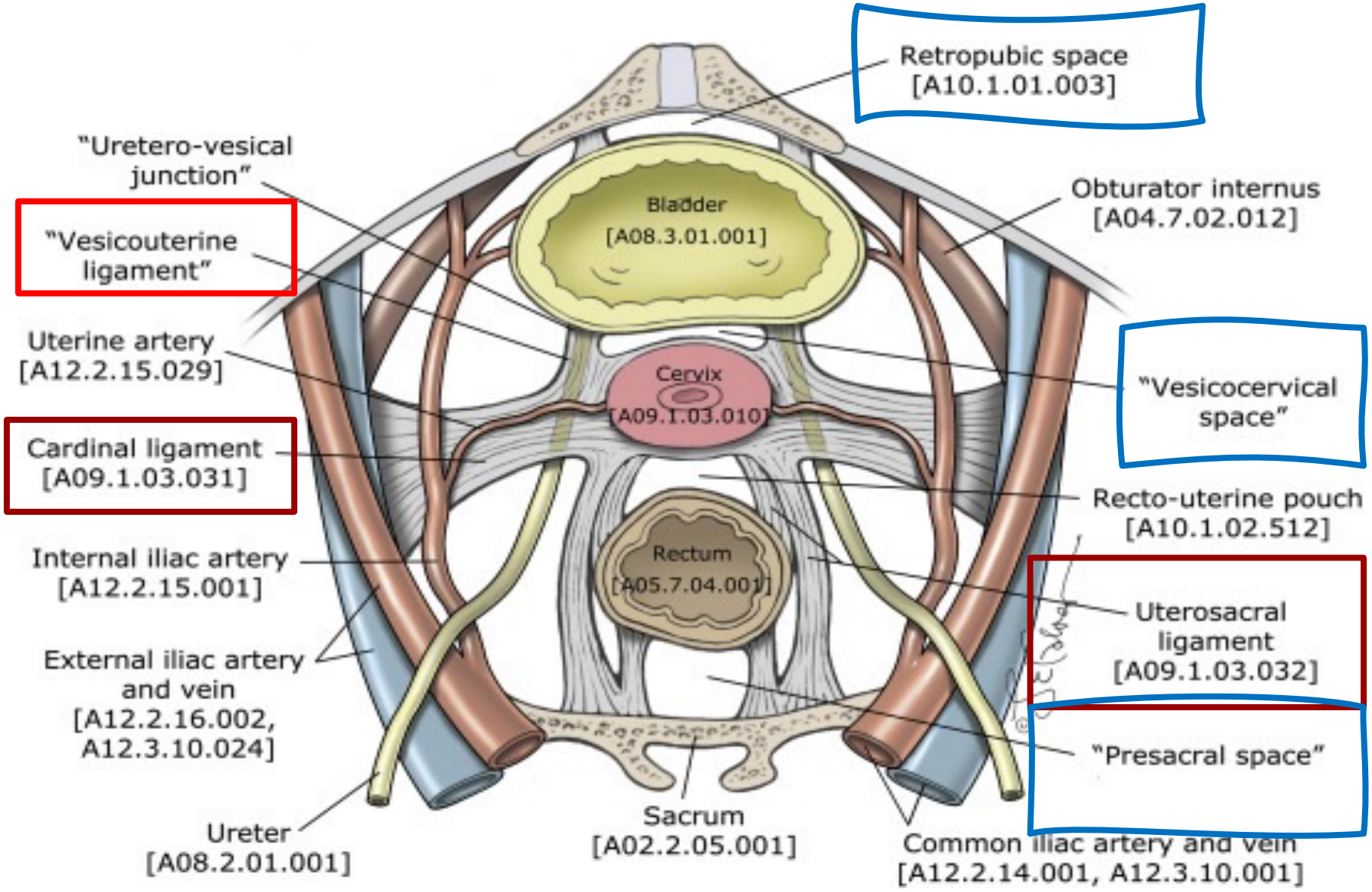
THE AVASCULAR PELVIC SPACES IN FEMALE ARE:

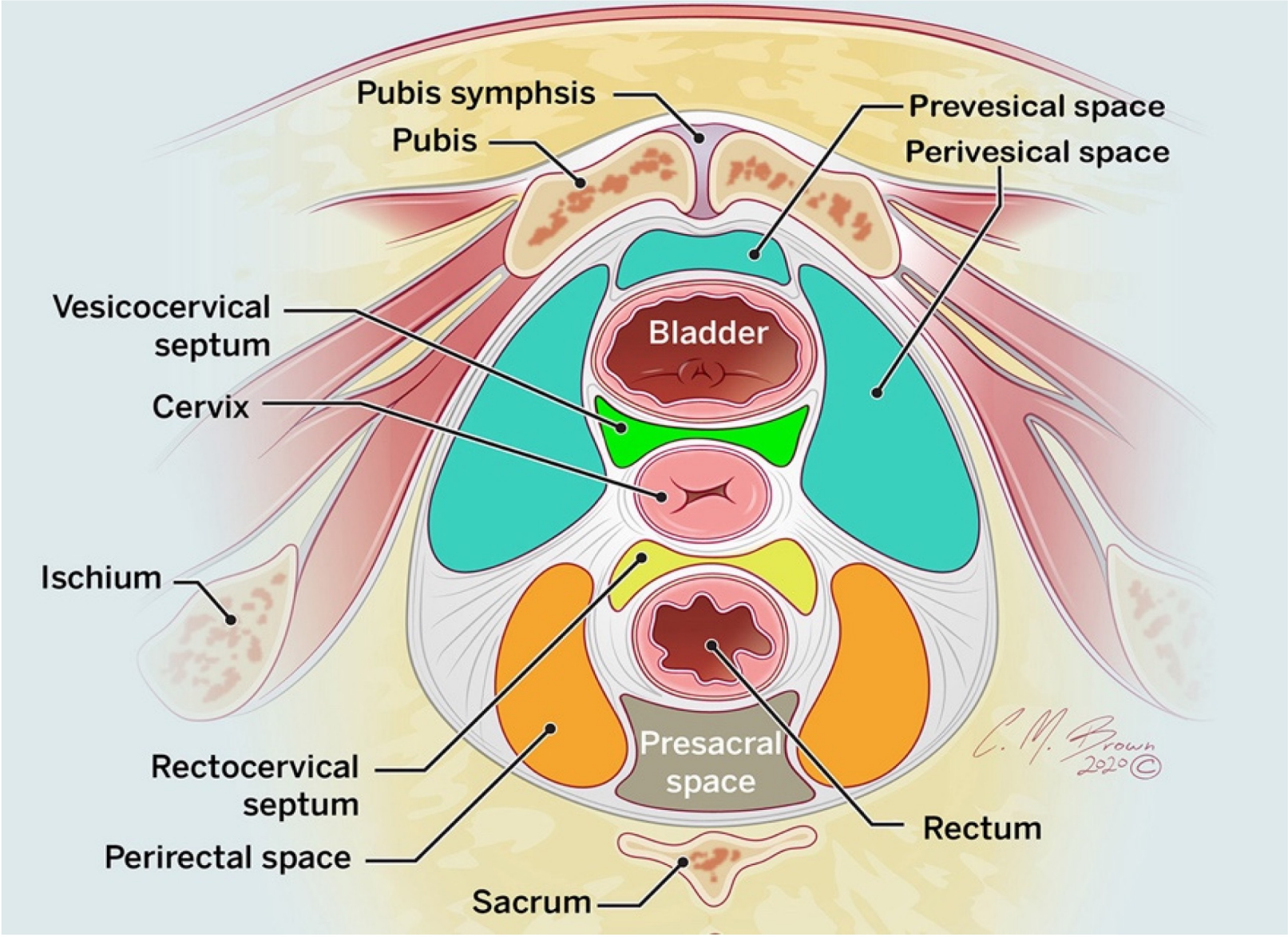
a) FOUR
b) SIX
c) EIGHT
d) NINE

Introduction

- An exact knowledge of the anatomy of the firm pelvic connective tissue is *necessary* for the gynecologic surgeon to avoid blood vessels running within these tissues during dissection, especially when anatomy is pathologically disturbed, thereby save the patient's blood during surgery.
- **Three** pairs of ligaments divide the pelvis into **eight** *potential* spaces filled with loose areolar connective tissue and ***are usually devoid of blood vessels and nerves.***
- These ligaments are ***pubocervicals***, ***mackenrodt's*** (cardinal or transverse cervicals, and ***uterosacrals***.


Peritoneum
Presacral fat
Rectosacral Fascia (Waldeyers)
Levator ani
Anococcygeal ligament
UT
UB
R


Retropubic space
[A10.1.01.003]
"Uretero-vesical junction"
"Vesicouterine ligament"
Bladder
[A08.3.01.001]
Obturator internus
[A04.7.02.012]
Uterine artery
[A12.2.15.029]
Cervix
[A09.1.03.010]
"Vesicocervical space"
Cardinal ligament
[A09.1.03.031]
Recto-uterine pouch
[A10.1.02.512]
Internal iliac artery
[A12.2.15.001]
Rectum
[A05.7.04.001]
Uterosacral ligament
[A09.1.03.032]
External iliac artery and vein
[A12.2.16.002, A12.3.10.024]
"Presacral space"
Ureter
[A08.2.01.001]
Sacrum
[A02.2.05.001]
Common iliac artery and vein
[A12.2.14.001, A12.3.10.001]


Pubis symphsis
Pubis
Prevesical space
Perivesical space
Vesicocervical septum
Bladder
Cervix
Ischium
Rectocervical septum
Perirectal space
Presacral space
Rectum
Sacrum
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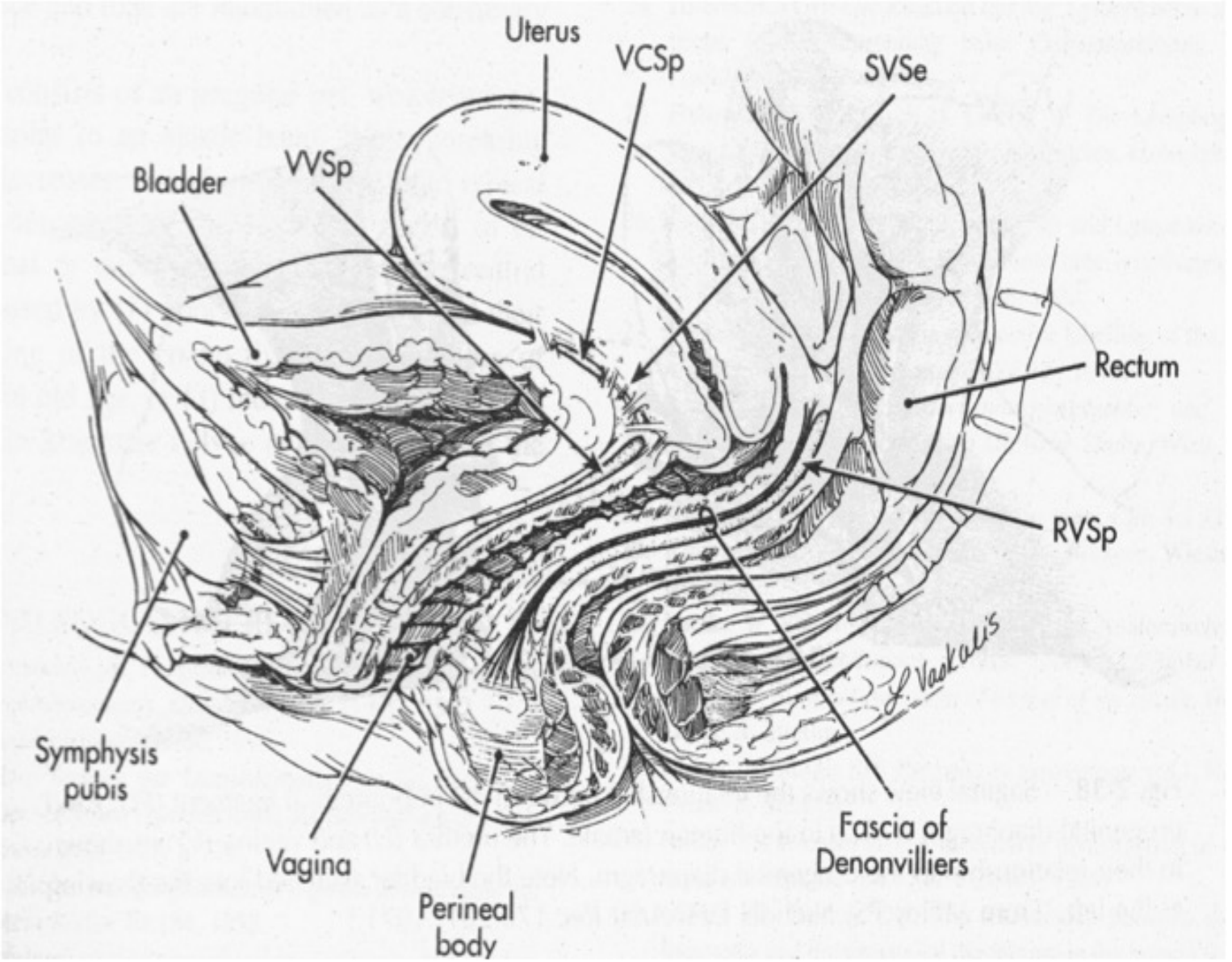
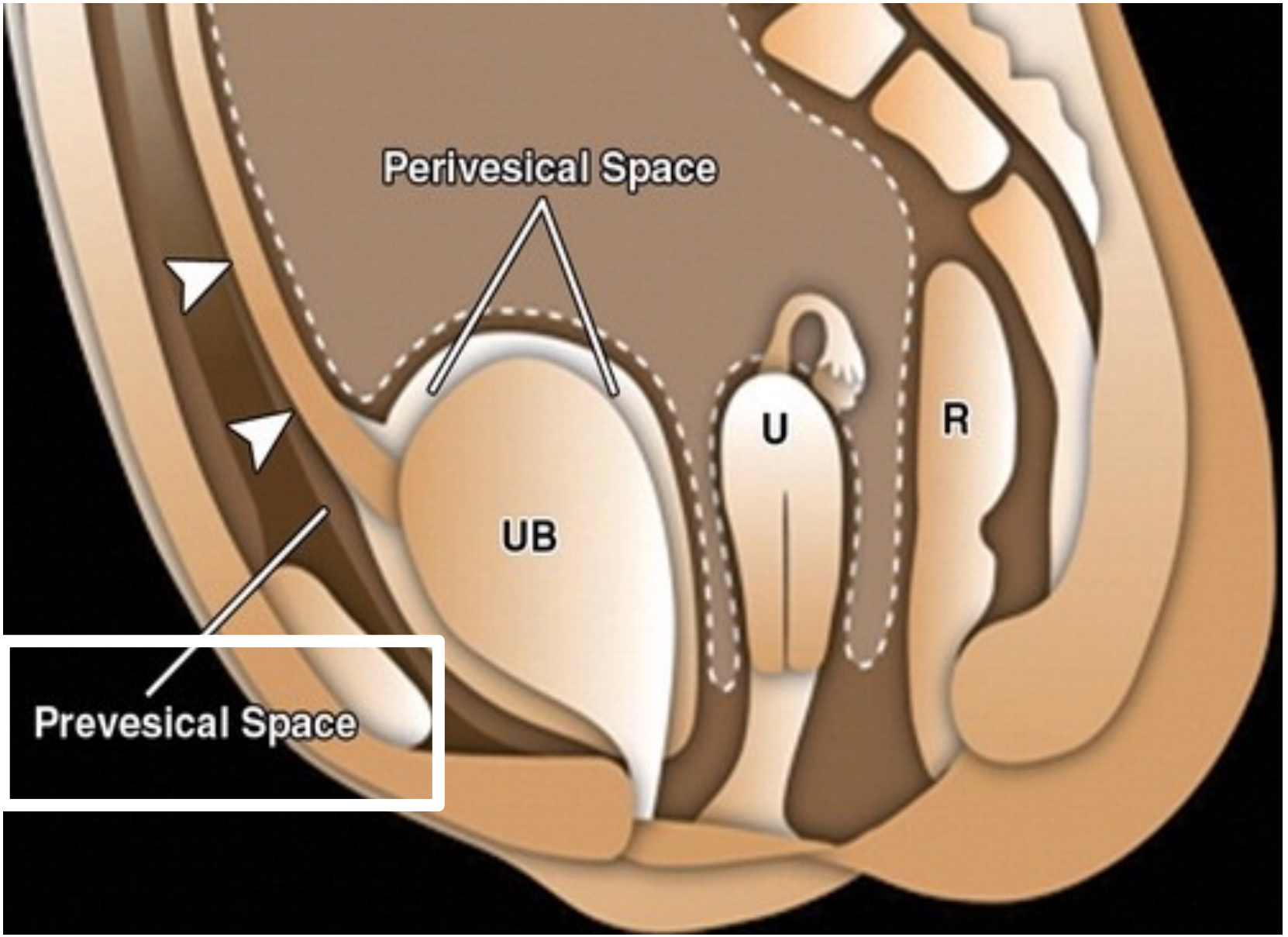

Uterus
VCSp
SVSe
Bladder
VVSp
Rectum
RVSp
Symphysis pubis
Vagina
Perineal body
Fascia of Denonvilliers
L. Vaskalis

Introduction

These spaces are:

- Prevesical space (Retzius),
- Two paravesical spaces……(Bilateral)
- Vesicovaginal space,
- Rectovaginal space,
- Two Pararectal spaces……..(bilat.)
- Retrorectal space, and Presacral space

I -Prevesical space (of Retzius)


Perivesical Space
U
R
UB
Prevesical Space

- **Is a fat- Filled space ; boundaries:**

It is separated from the undersurface of the rectus abdominis muscle by the transversalis fascia and can be entered by perforating this layer.

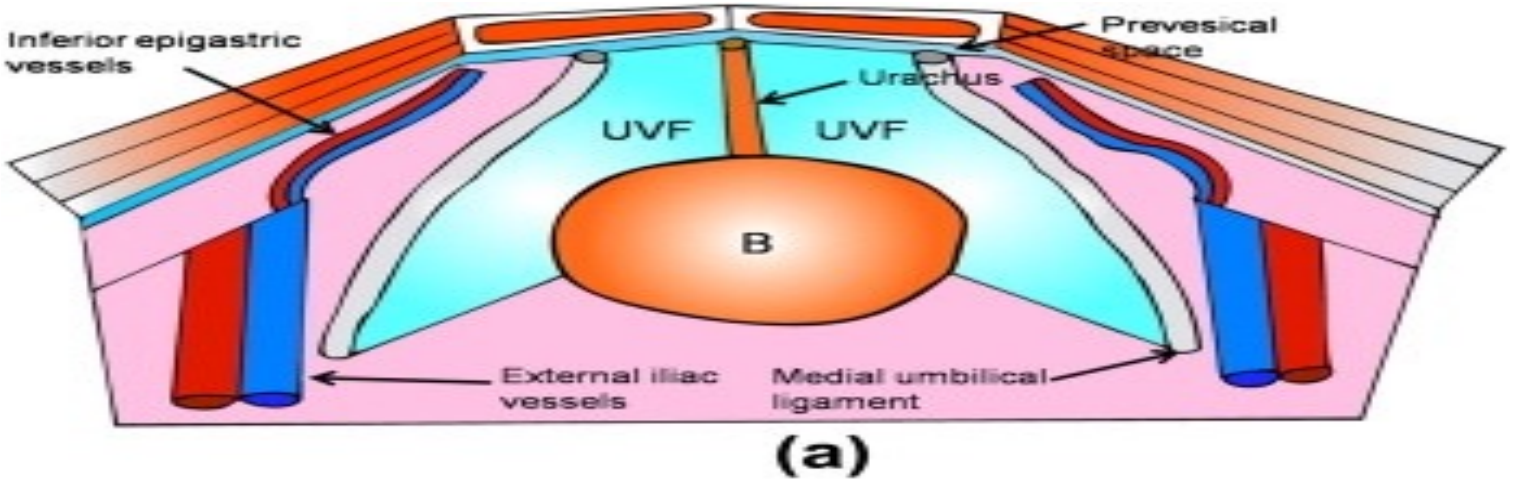
- *Anterior*: by the pubic bone covered by the transveralis fascia and extending to the umbilicus between the lateral umbilical ligaments (obliterated umbilical arteries).

-***Posterior***: the anterior wall of the bladder.

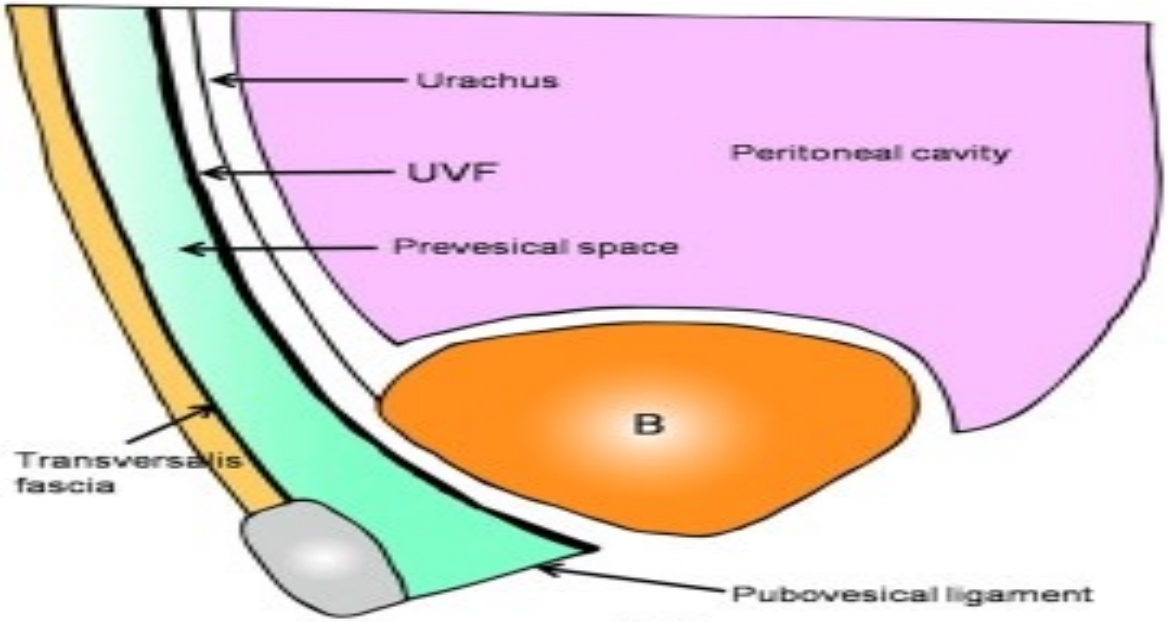
-The **floor** of this space = urethra, the parau-rethral (pubo-urethral) ligaments, and the urethro-vesical junction (bladder neck) .

- The **inferior** = pubic symphysis and the adjacent superior pubic rami with Cooper's ligament represent.

-It separated from the para-vesical space by the ascending bladder septum (bladder pillars)


Inferior epigastric vessels
Prevesical space
Urachus
UVF
UVF
B
External iliac vessels
Medial umbilical ligament

(a)


Urachus
UVF
Peritoneal cavity
Prevesical space
B
Transversalis fascia
Pubovesical ligament

(b)

Prevesical space (of Retzius)

IMPORTANT STRUCTURES LYING WITHIN PVS:

1- Dorsal vein of the clitoris

2-Obturator nerve

3-Branch to obturator canal from external iliac artery

4-Dense plexus of vessels near bladder neck

5-Nerves to lower urinary tract

6- iliopectineal line (ridge-like fold of periosteum used to anchor sutures during urethral suspension operations

Prevesical space (of Retzius)

- **Clinical importance**

1-Upon entering the space, the pubo-uretheral ligaments may be seen inserting in the posterior aspect of the symphysis pubis as a thickened prolongation of the arcus tendinous fascia

2- Combined abdominal and vaginal bladder neck suspension procedures usually enter the Retzius space between the arcus tendinus and the pubo-uretheral ligament.

- **Access to PVSp:**

1- Open access: cutting the rectus muscle in the midline & dissection between the muscle superficially & the peritoneum deep towards the symphysis pubis.

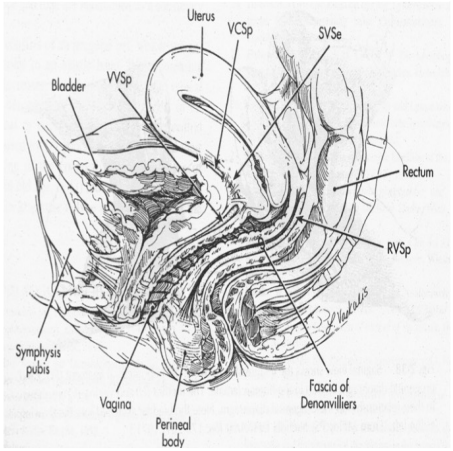
2- Laparoscopic access: intra-peritoneal approach, insufflation helps dissection.

- Video domenstration

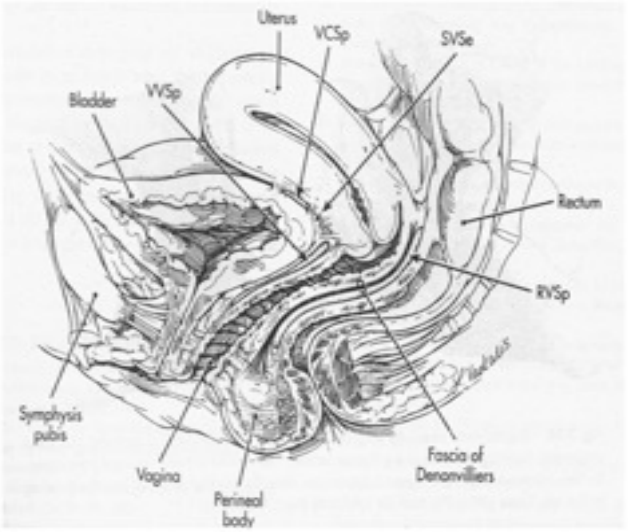
II- Vesicovaginal and vesicocervical space

- The space between the lower urinary tract and the genital tract is separated into the vesicovaginal and the vesicocervical spaces by a thin septum, the ***supravaginal septum*** .
- The lower extent of the space is the junction of the proximal ⅓ and the distal ⅔ of the urethra, where it fuses with the vagina, and extends to lie under the peritoneum at the vesicocervical peritoneal reflection.
- It extends laterally to the pelvic sidewalls,

separating the vesical and genital aspects of the cardinal ligaments.



Vesico-vaginal space (VVSp)



- **Lies in the midline and is bounded by:**

-*Anterior*: the bladder adventitia

-*Posterior*: the anterior vaginal wall adventitia

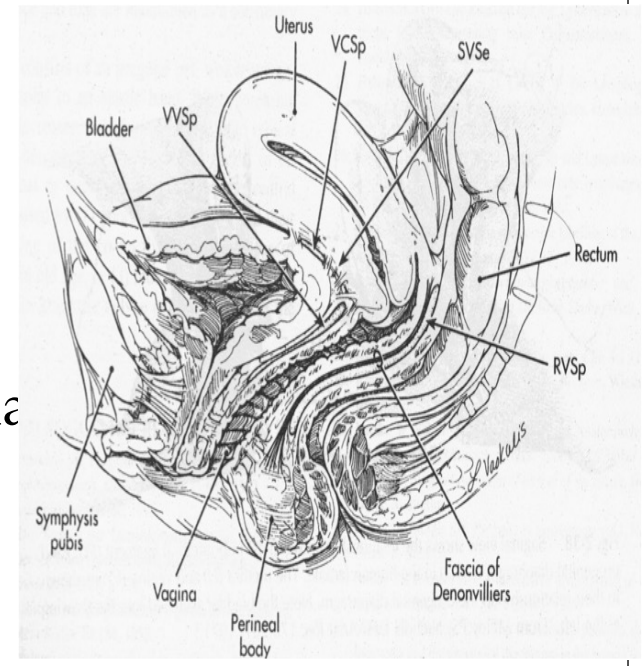
-*Laterally*: the bladder septa or pillars

-*Superior*: by the point of fusion between the bladder adventitia and the vaginal adventitia. This point is called *the supravaginal septum or vesico-vaginal ligament*

-*Inferiorly*: the vesico-vaginal space is limited by the fusion of the uretheral and vaginal adventitia

- ***Clinical importance:*** Tear of the fascial investments and thickenings medially, transversely or laterally allow herniation and development of a cystocele.

Vesico-cervical space:



- Is a *continuation* of the vesicovaginal space superiorly above the supravaginal septum:
- Boundaries:

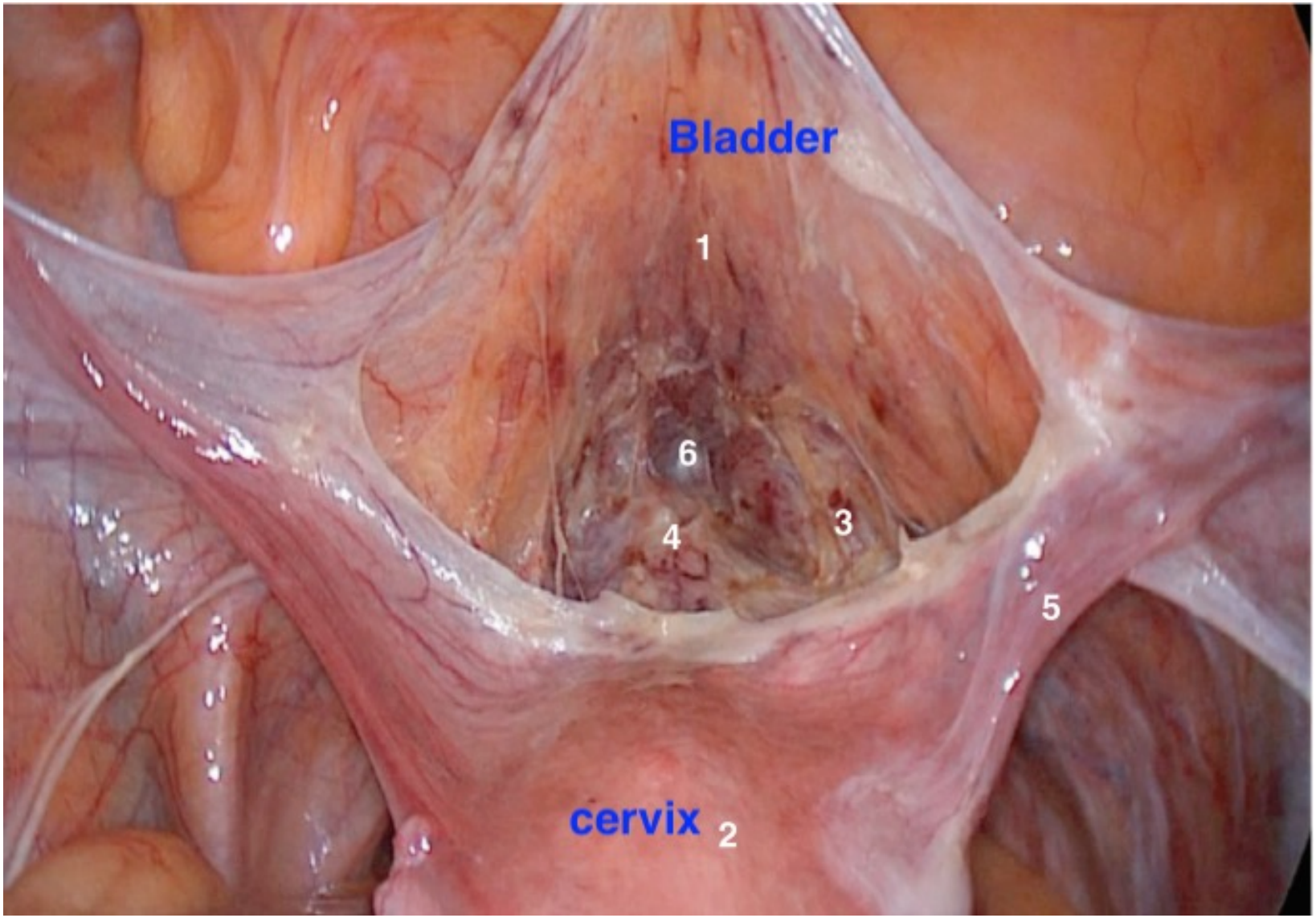
Posterior: the adventitia of the cervix and vagina

Anterior: the bladder adventitia

Superior: the vesicouterine peritoneal pouch

Inferior: the supravaginal septum

- Cutting the supravaginal septum establishes communication between the vesicovaginal space and vesico-cervical space


Bladder
1
6
4
3
5
cervix
2

Vaginal approach vcs & vvs

III- RECTOVAGINAL SPACE

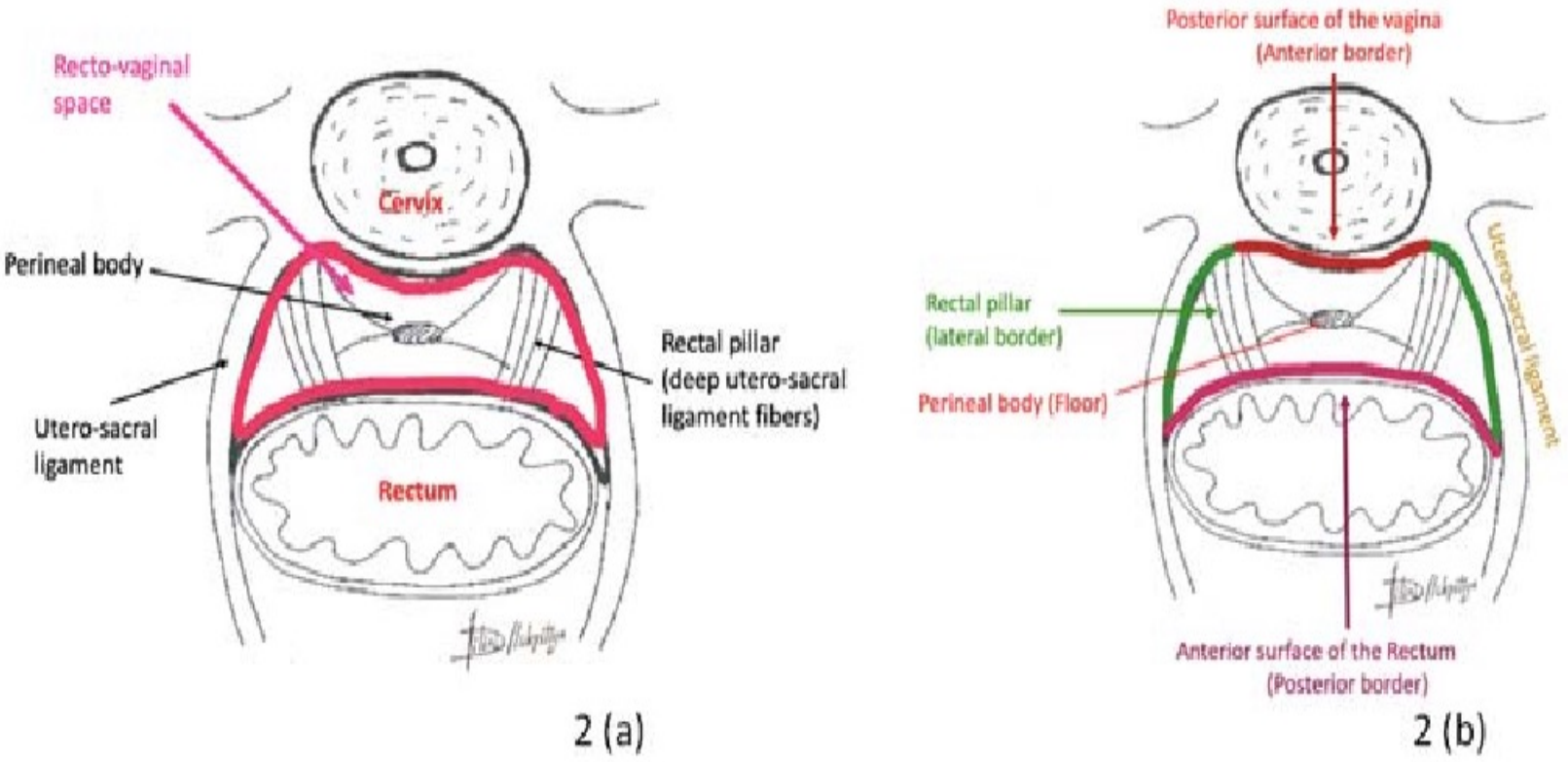


Figure 2. **Rectovaginal space.**

Recto-vaginal space:

- **Extends between the vagina and rectum. It is bounded by:**

-*Anterior*: the recto-vaginal septum

-*Posterior*: the anterior rectal wall

-*Lateral*: the descending rectal pillars

separating the recto-vaginal space

from the para-rectal space on each

side

-*Superior*: peritoneum of Douglas pouch

-*Inferior*: the perineal body 2 to 3 cm above the hymenal ring

Recto-vaginal space: cont.,

- *Clinical importance:*

1-It divides the pelvis into rectal and urogenital compartments allowing the independent function of the vagina and rectum.

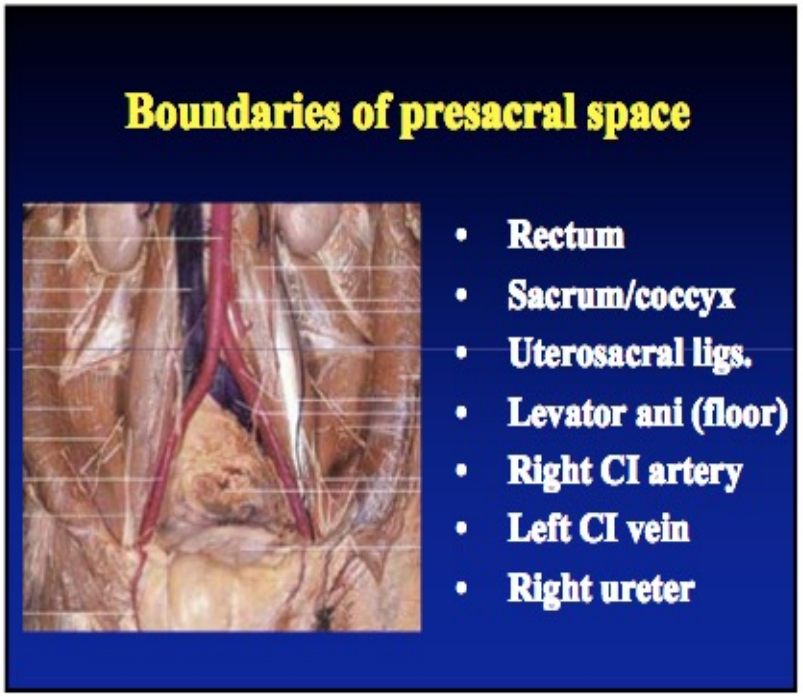
2-An anterior rectocele results from a defect or an avulsion of the septum from the perineal body.

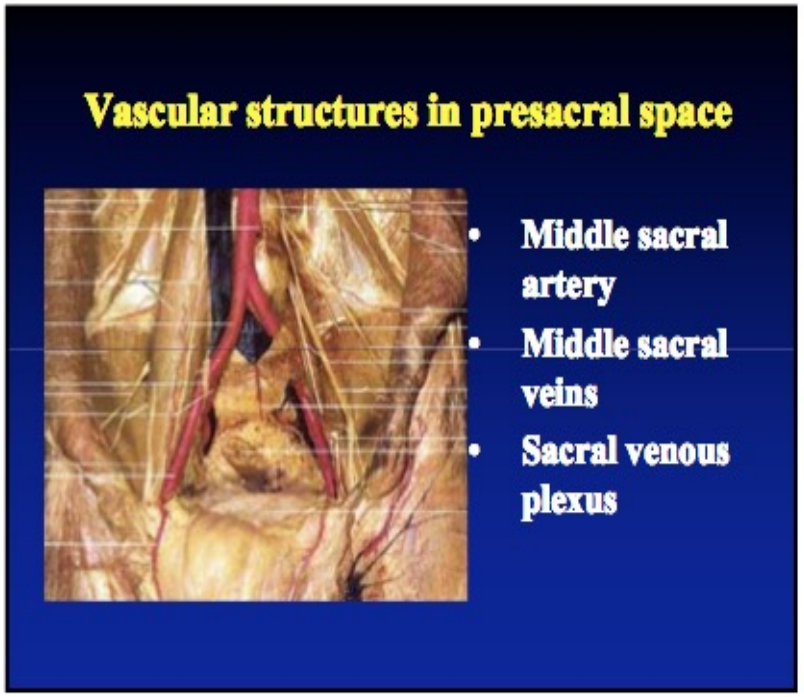
3- Reconstruction of the perineum is critical for the restoration of this important compartment separation as well as for support of the anterior vaginal wall

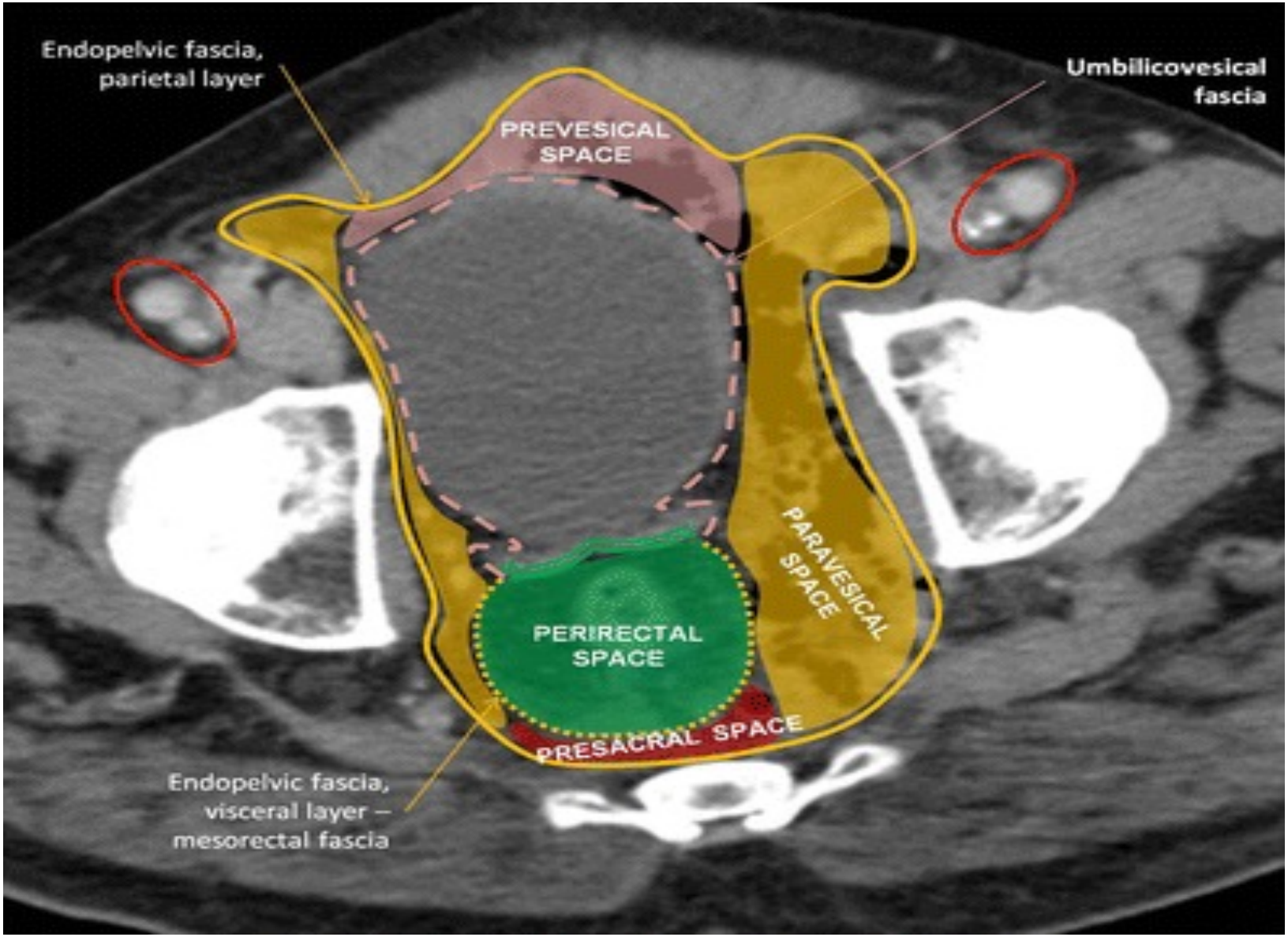

Cervix uteri
Posterior vaginal wall

IV- PRESACRAL & RETRORECTAL SPACES

- The pre-sacral/retro-rectal space begins below the biforcation of the aorta and bounded laterally by the internal iliac arteries






Endopelvic fascia, parietal layer
Umbilicovesical fascia
PREVESICAL SPACE
PARAVESICAL SPACE
PERIRECTAL SPACE
PRESACRAL SPACE
Endopelvic fascia, visceral layer – mesorectal fascia

Retro-rectal space:

- It is the space posterior to the rectum.
- **Boundaries**:

-*Anteriorly*: by the adventitia of the rectum

-*Posteriorly*: by the anterior aspect of the sacrum

-*Laterally*: it communicates with paraectal spaces, laterally above the uterosacral ligament and extends superiorly into the pre-sacral space

Pre-sacral space

- **Is the superior extension of the retrorectal space and is bounded:**
  - ***Anteriorly*: by the deep parietal peritoneum**
  - ***Posteriorly*: by the anterior aspect of the sacrum**

- ***Clinical importance***

- This space contains the middle sacral vessels and the hypogastric plexus between the bifurcation of the aorta.

- Presacral neurectomy requires a good familiarity and knowledge of this space

Nerves in pre-sacral space:

-The *inferior hypogastric plexus* includes efferent sympathetic fibers, afferent (sensory) fibers, and parasympathetic fibers arising from the ***pelvic splanchnic nerves (S2 to S4, nervi erigentes).***

This paired plexus is the final common pathway of the pelvic visceral nervous system and is divided into three portions, representing distribution of innervation to the viscera:

1. Vesical plexus

- Innervation: bladder and urethra
- Course: along vesical vessels

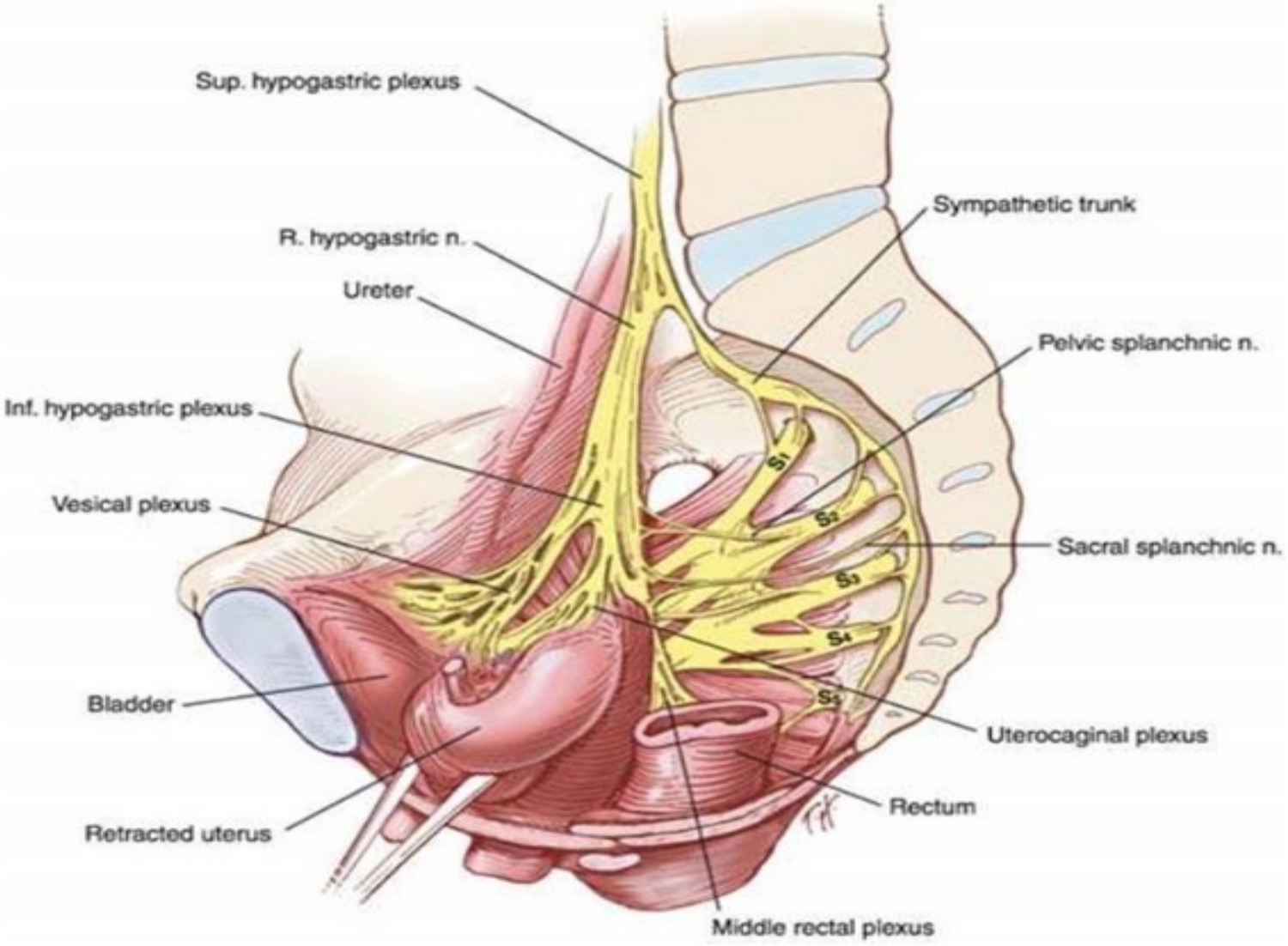
2. Middle rectal plexus (hemorrhoidal)

- Innervation: rectum
- Course: along middle rectal vessels

3. Uterovaginal plexus (Frankenhäuser ganglion)

- Innervation: uterus, vagina, clitoris, vestibular bulbs
- Course: along uterine vessels and through cardinal and uterosacral ligaments; sympathetic and sensory fibers derive from T10, L1; parasympathetic fibers derive from S2 to S4.

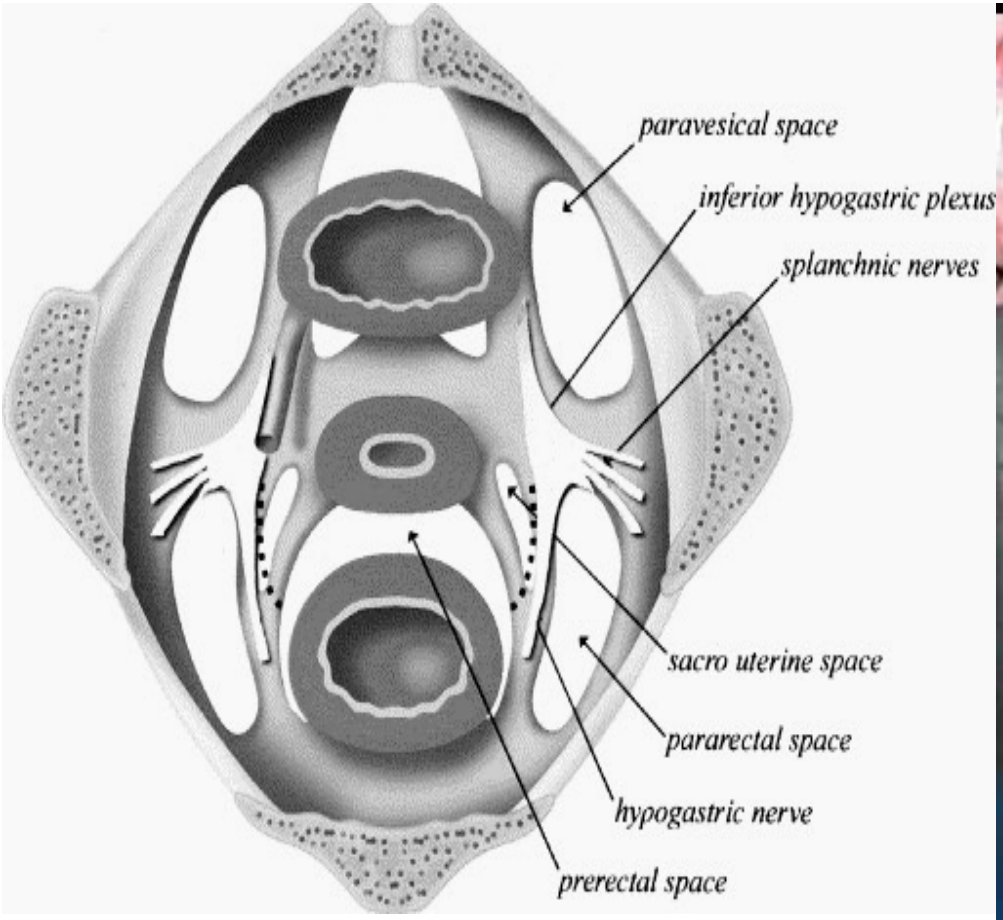
Figure 5.9 The presacral nerves.

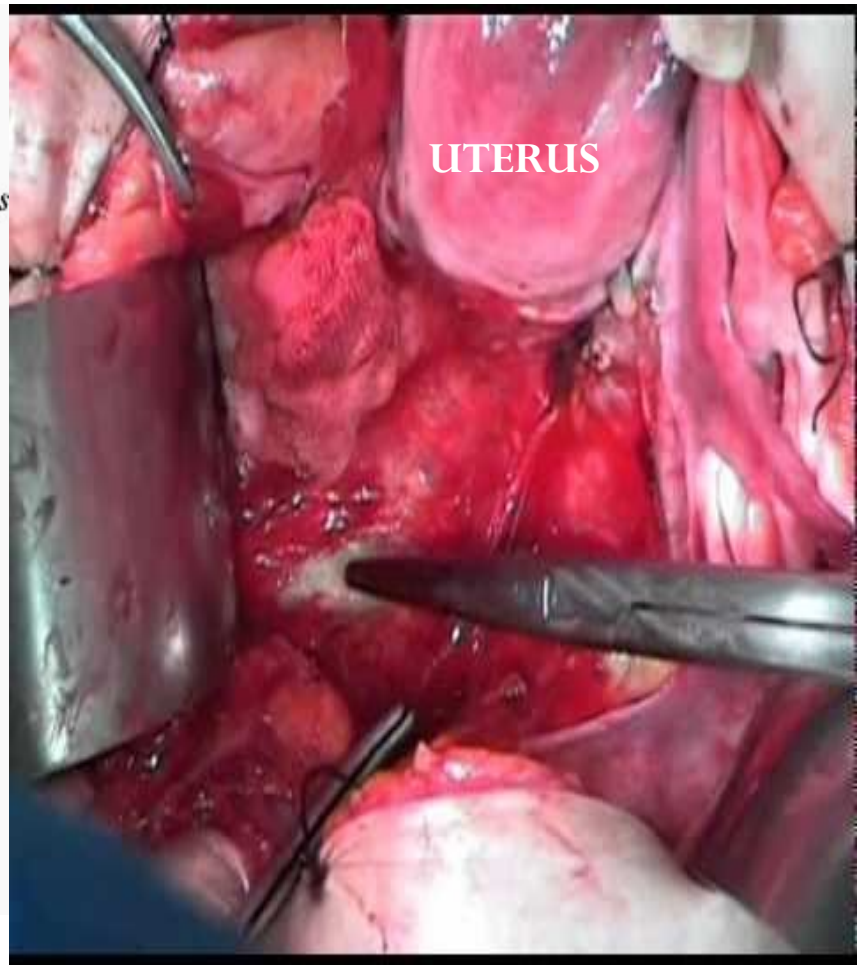


Accessing the Presacral Space

- Sigmoid colon is retracted to the left
- Peritoneum is incised in the midline over the sacral promontory
- This avoids injury to the common iliac vessels
- Visualize ureters

V- PARAVESICAL SPACES





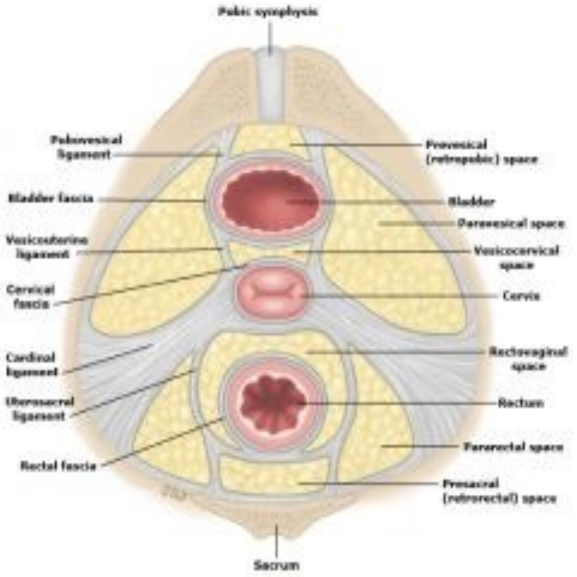
Para-vesical spaces

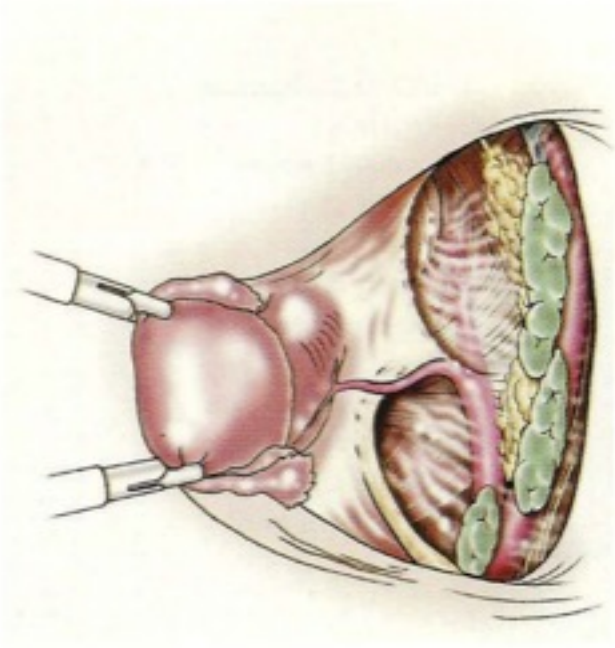
- **Right and Left spaces**
- **Lie above the cardinal ligament and its prolongation**
- **Boundaries:**

✓ ***Medially*: by the bladder pillars**

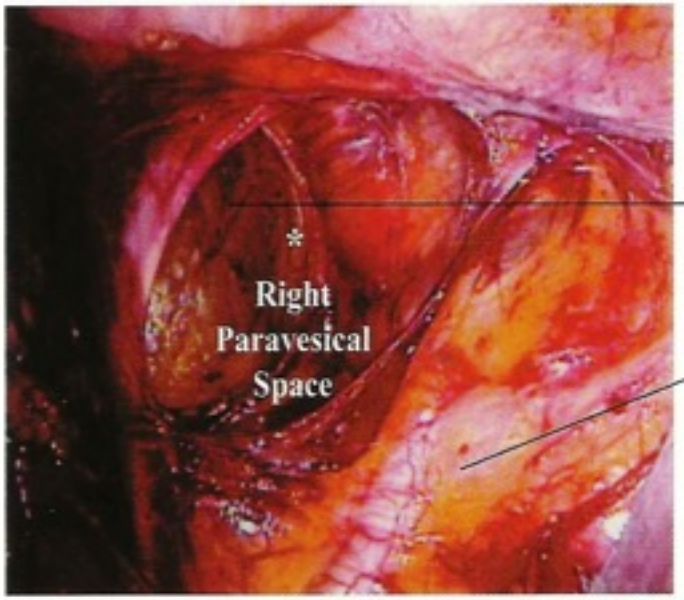
✓ ***Laterally*: by the pelvic walls (the fascia of obturator internus and levator ani)**

✓ ***Superiorly*: by the lateral umbilical Ligament.**

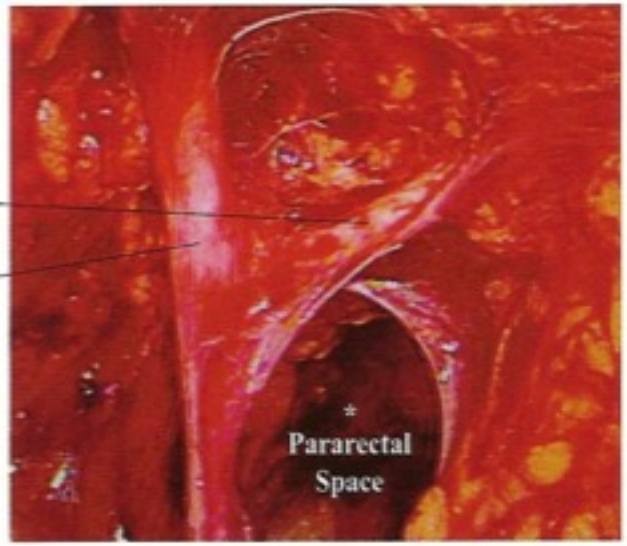




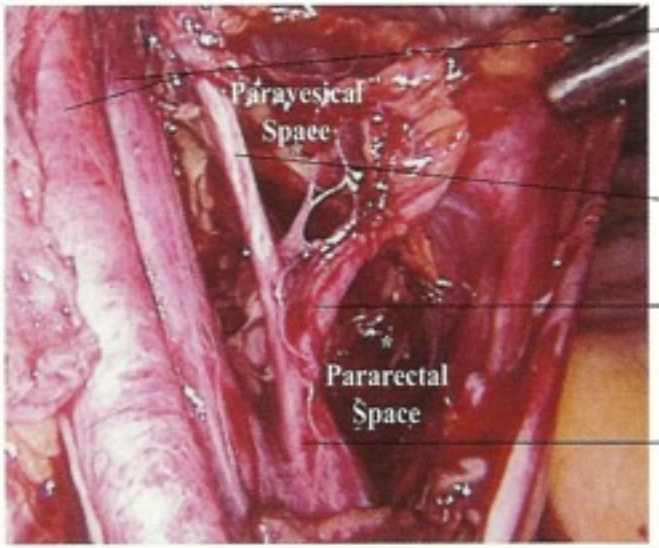
A


Right obliterated umbilical artery
Right Paravesical Space
Right external iliac artery

B


Left uterine artery
Left obliterated umbilical artery
Pararectal Space

C


Left external iliac artery and vein
Paravesical Space
Obliterated umbilical artery
Left uterine artery
Pararectal Space
Left hypogastric artery

D

VI- PARA-RECTAL SPACES

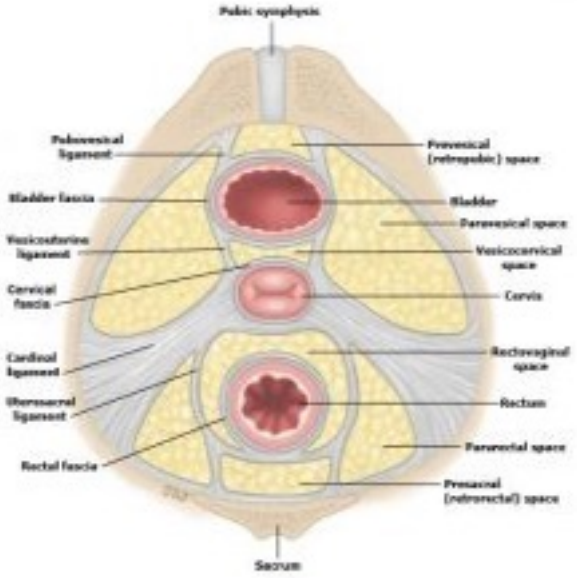
- Right and Left spaces
- **Boundaries**:

  -*Medially*: by the rectal pillars

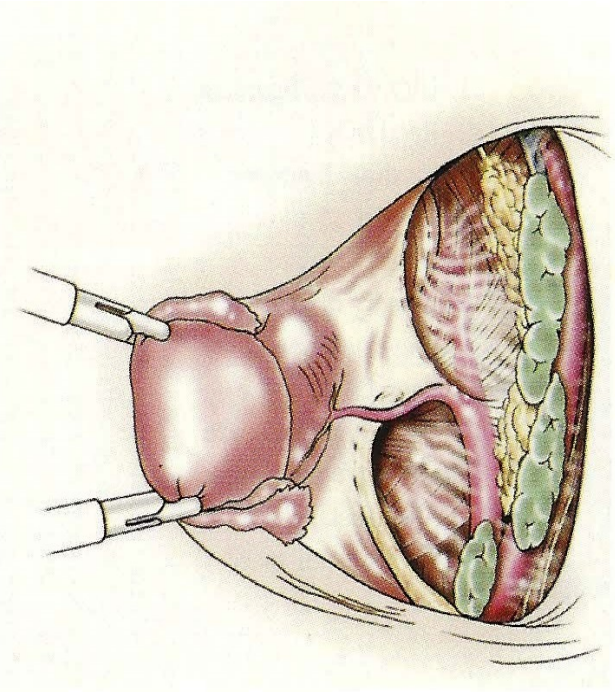
  -*Laterally*: by the levator ani.

  - *Posteriorly*: above the ischial spine

by the antero-lateral aspect of the sacrum



- It is separated from the retro-rectal space by the posterior extending descending rectal pillars.



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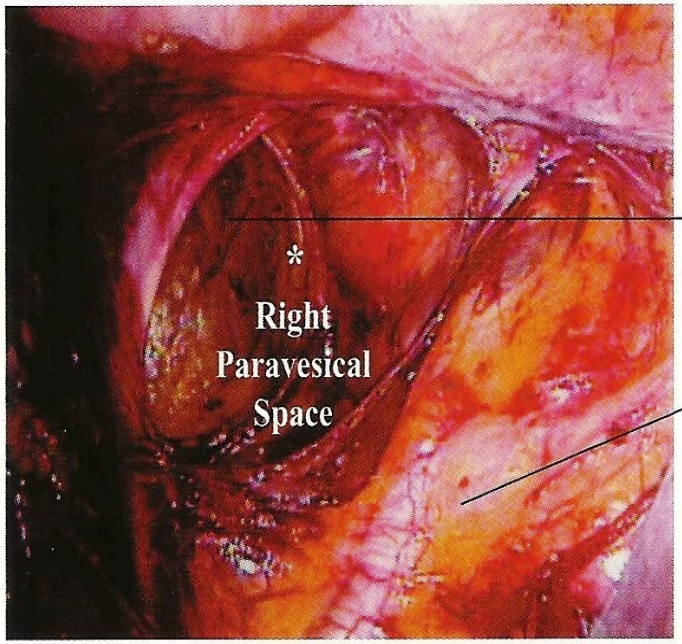
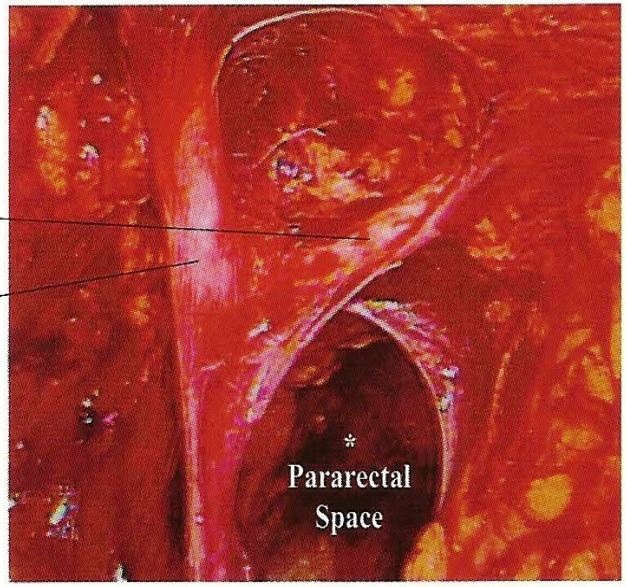
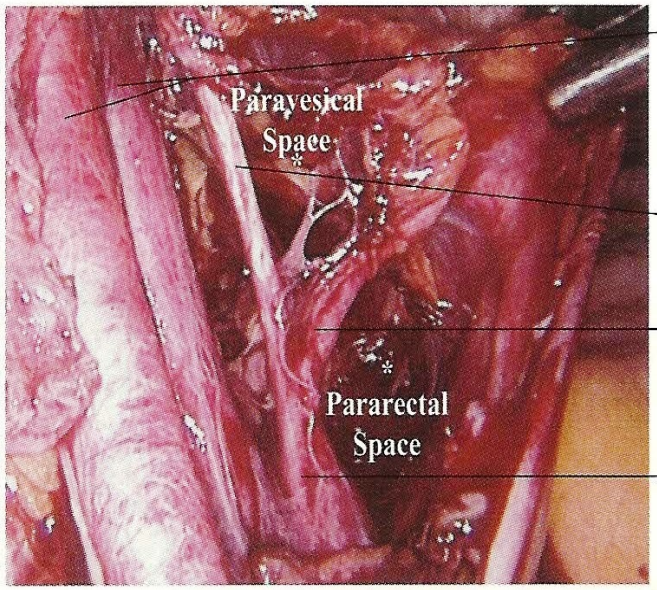

Right obliterated umbilical artery
Right Paravesical Space
Right external iliac artery

B


Left uterine artery
Leftt obliterated umbilical artery
Pararectal Space

C


Left external iliac artery and vein
Paravesical Space
Obliterated umbilical artery
Left uterine artery
Pararectal Space
Left hypogastric artery

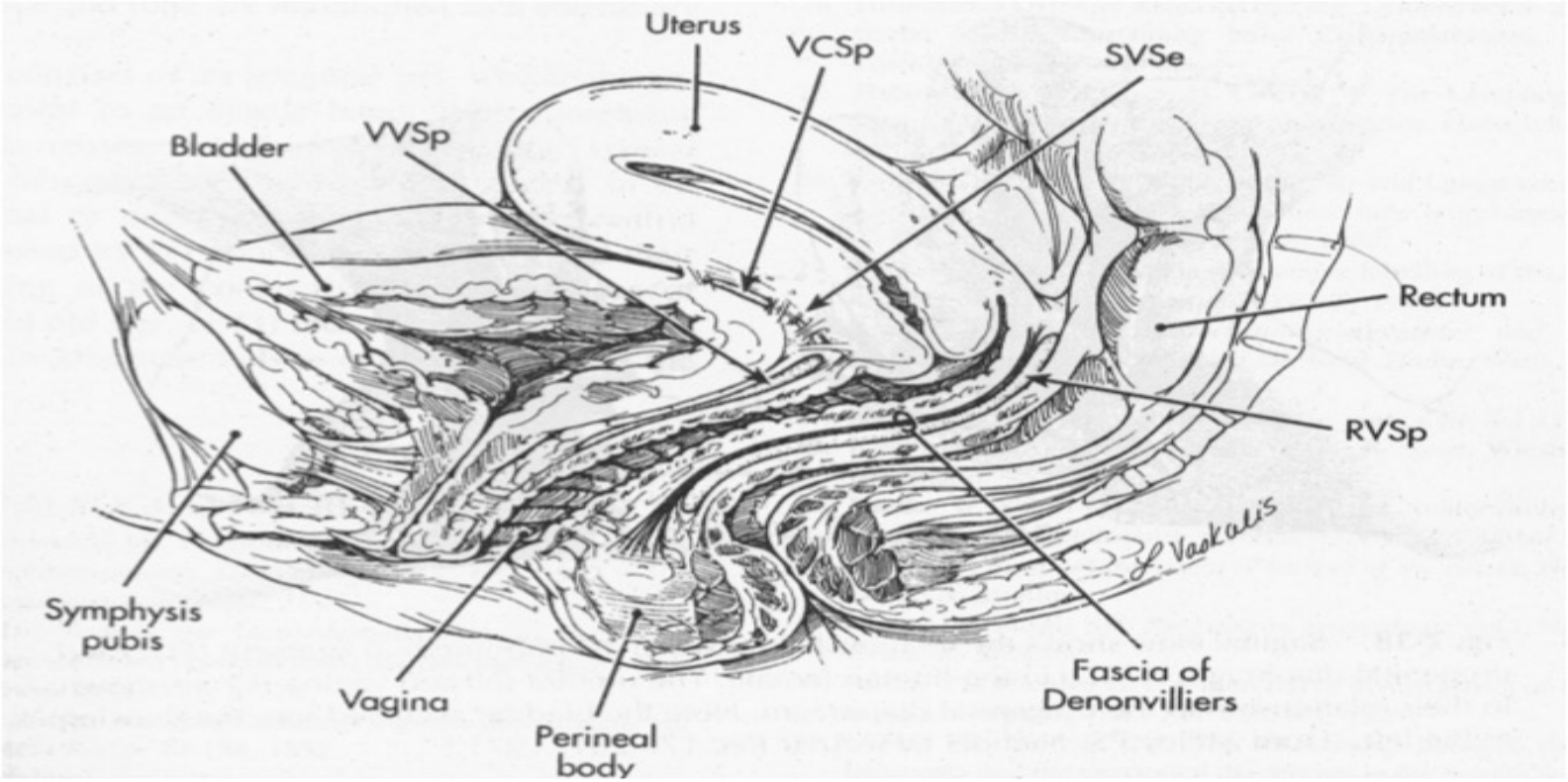
D

Video domenstration

THE CONNECTIVE TISSUE SEPTA

The supra-vaginal septum

- Represents the point of fusion between the connective tissue support of the bladder and that of the upper vagina and cervix



Supra-vaginal septum (cont.)

- ***Clinical importance***

1- Cervical cancer may directly invade the wall of the bladder along this septum

2- The connective tissue of the septum may be softened considerably in pregnancy with the increase in elasticity that occur to accommodate the necessary stretching as the uterus enlarges as well as the contraction of the uterus in labor with minimal alteration in bladder function.

Supra-vaginal septum (cont.)

3-This softening accounts for the ease with which the bladder may be bluntly separated from the LUS. and cervix at CS in contrast to need for sharper surgical division of these organs in the **non** pregnant state.

4- The *vaginal* operator may incise directly through the point of fusion between the bladder and vagina providing access to the vesico-uterine peritoneal fold

5-The *abdominal* operator will first enter the anterior peritoneum continuing the dissection beneath the connective tissue capsule of the uterus beneath or through the supra-vaginal septum which is the principle of the so called endo-fascial (=intra-fascial) abdominal hysterectomy.

The recto-vaginal septum:

- This septum represent fusion of the walls of the fetal peritoneal pouch
- It extends from the caudal margin of the cul- de- sac to the proximal edge of the perineal body.
- It consists of dense collagen, abundant smooth muscle fibers, coarse elastic fibers demonstrated by special stain (Orcien)
- *Clinical importance*

- Avulsion of septum → rectocele , constipation
- Failure of normal fusion early in life may → congenital enterocele due to deep cul- de- sac

Thank you