

1d. Anatomy of Female internal and external genital organs with applied aspects

d) Anatomy of Female Internal & External Genital Organs — with Applied Aspects

Learning goals

By the end of this chapter you will be able to (i) name and describe the **external genitalia (vulva)** and **internal genital organs** with relations, blood-lymph-nerve supply and supports; (ii) recall classical Ayurvedic descriptions relevant to **yoni/garbhaśaya** and marma-kṣetra; and (iii) apply key points to obstetric-gynecologic procedures and common clinical conditions.

[Female Reproductive System Foundation](#)

[3D model](#)

[Female System Reproductive \(Basic\)](#)

[3D model](#)

[Female External Genitalia and Perineum](#)

[3D model](#)

[Female Urogenital Triangle](#)

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[Vulva Anatomy 3D model](#)

[Female Reproductive System Tour](#)

[3D model](#)

[Female Reproductive Cross Section \(Sagittal\)](#)

[3D model](#)

1) Orientation: classical-modern bridge

Ayurveda uses the functional term **Yoni** (the parturient passage/apatyapatha) and **Garbha-āśaya (uterus)** for the reproductive bed, set amidst **basti** (urinary bladder) and posterior viscera. Suśruta lists the **garbhāśaya** as an additional āśaya unique to females; women also have external conduits for **stanya** and **ārtava**. (Suśruta Saṃhitā, Śārīrasthāna 5; English translation index)

“शारीरे चैव शास्त्रे च दृष्टार्थः स्यादविशारदः ।

दृष्टश्रुताभ्यां सन्देहमवापोह्याचरेत् क्रियाः ॥ (सु. सं. शारीरस्थ 5/51)” — *One becomes adept when the truths of the body and the śāstra are both directly seen; removing doubts by what is seen and heard, one should then act.*

2) External genital organs (Vulva)

2.1 Components you must enumerate

- **Mons pubis:** fatty pad over pubic symphysis.
- **Labia majora:** hair-bearing skin folds; meet at anterior/posterior commissures; contain **round-ligament terminations** and superficial venous plexus.
- **Labia minora:** thin mucocutaneous folds; form **prepuce** and **frenulum** of clitoris; join inferiorly to form **fourchette**.
- **Clitoris:** erectile organ (two crura → body → **glans**); homologous to male corpora cavernosa; rich dorsal neurovascular bundle.
- **Vestibule:** space between labia minora housing **external urethral meatus**, **vaginal orifice**, **openings of para-urethral (Skene's) glands** and **greater vestibular (Bartholin) glands** at 4 & 8 o'clock.
- **Bulb of vestibule:** paired erectile masses along vaginal opening, covered by **bulbospongiosus**.

- **Perineal body (central tendon):** fibromuscular node posterior to vaginal opening anchoring **bulbospongiosus, superficial & deep transverse perineal, external anal sphincter, parts of levator ani**—critical for pelvic support.

2.2 Blood-lymph-nerve supply

- **Arterial:** primarily **internal pudendal** (perineal branches; **dorsal artery of clitoris**); superficial regions from **external pudendal** (femoral).
- **Venous:** pudendal venous plexus → internal pudendal vein.
- **Lymph:** superficial vulva → **superficial inguinal nodes** (remember: **labia minora/clitoris deep channels** also to deep inguinal).
- **Somatic nerves:** **pudendal nerve (S2-S4) — inferior rectal, perineal, dorsal nerve of clitoris**; ilio-inguinal & genitofemoral supply the mons/anterior labium. Sensation is somatic—hence episiotomy pain requires regional block.

2.3 Applied anatomy (external)

- **Pudendal nerve block:** insert needle near **ischial spine** (palpated transvaginally) close to **sacrospinous ligament** to anaesthetise perineum for repair/forceps delivery.
- **Episiotomy: mediolateral** episiotomy avoids injury to **external anal sphincter**; protect the **perineal body** to prevent future prolapse.
- **Perineal tears:** Degree I (mucosa/skin) → IV (including anal mucosa). Correct layered repair prevents fistula and chronic pain.
- **Bartholin pathology:** cyst/abscess at posterolateral introitus; **marsupialization** in recurrent cases.
- **FGM and trauma awareness:** scarring can distort vestibule, complicate delivery and micturition (counseling and multidisciplinary care).

3) Vagina (Apatyapatha: first avarta in classical mapping)

Extent: vestibule → **cervix**; length ~8-10 cm; anterior/posterior **fornices** surround cervix (posterior fornix deepest).
Relations: anterior—bladder & urethra; posterior—rectouterine pouch (Douglas) and rectum; lateral—pelvic fascia & **ureter** high up.

Wall: mucosa (stratified squamous, rugae), muscular (inner circular, outer longitudinal), adventitia (rich venous plexus). pH ~ 3.5-4.5 (lactobacilli).

Arterial supply: **vaginal artery** (internal iliac), plus branches from **uterine, internal pudendal** and **middle rectal**.

Venous: vaginal venous plexus → **internal iliac veins**.

Lymph: **upper 2/3** → **internal iliac nodes**; **lower 1/3** → **superficial inguinal nodes**.

Nerves: upper vagina—visceral (uterovaginal plexus); **lower 1/5**—somatic via **pudendal** (pain, touch).

Applied:

- **Cervical smear** taken at **transformation zone** (squamocolumnar junction) via speculum; posterior fornix is safe site for **culdocentesis** in suspected hemoperitoneum.
- **Vesicovaginal/rectovaginal fistulae** follow obstetric trauma—prevention is meticulous obstetric care and perineal repair.

4) Uterus (Garbha-āśaya)

Site & position: normally **anteverted-anteflexed** between **bladder (anterior)** and **rectum (posterior)**. **Nulliparous size:** ~7.5 × 5 × 2.5 cm; weight ~50-60 g. **Parts:** **fundus, body, isthmus (internal os ↔ histological change), cervix** (supravaginal & vaginal parts).

Layers: **Perimetrium, myometrium** (oblique spiral fibers—haemostatic “living ligatures”), **endometrium** (functional & basal layers).

Blood supply:

- **Uterine artery** (internal iliac, traverses **cardinal ligament**, crosses **ureter** “water under the bridge”).
- **Ovarian artery** (aorta)—anastomoses at uterine cornu.
Venous plexus drains to internal iliac; **Lymph**—fundus → para-aortic (via ovarian vessels) and along **round ligament** → **superficial inguinal**; **body** → external iliac; **cervix** → internal iliac & sacral.
- **Nerves:** uterovaginal plexus; pain from **fundus/body** with sympathetics (T12-L2), from **cervix** with parasympathetics (S2-S4).

Supports of uterus (write these exactly):

- **Passive:** anteversion/anteflexion over bladder; endopelvic fascia; intra-abdominal pressure.
- **Fibromuscular ligaments:** **cardinal** (Mackenrodt's/transverse cervical), **uterosacral**, **pubocervical**; **round ligaments** maintain anteversion.
- **Pelvic diaphragm:** **levator ani** (pubococcygeus—especially **pubovaginalis/pubocervicalis**), coccygeus.
Applied correlations:
- **Uterine prolapse** follows perineal body & ligamentous failure—rehabilitate pelvic floor (mild) or perform suspension procedures.
- **Lower segment caesarean section (LSCS)** exploits **thin lower uterine segment**; avoid urinary bladder injury (reflection of peritoneum).
- **Hysterectomy**—guard **ureter** at uterine artery crossing (“water under the bridge”).
- **Fibroids (leiomyomas)**—commonest tumour; submucous fibroids cause menorrhagia & infertility; blood supply from uterine artery explains **uterine artery embolization** logic.

Classical note: Suśruta lists **Garbhāśaya** as an additional āśaya in females and counts **ducts/canals** for **stanya** and **ārtava** that open to the outside—an elegant early systems view.

5) Uterine (Fallopian) tubes — tubā uterīnae

Length: ~10 cm; **parts:** **intramural (uterine)**, **isthmus**, **ampulla** (widest; **usual site of fertilization**), **infundibulum** with **fimbriae** (one **ovarian fimbria** attaches to ovary).

Blood: uterine & ovarian arteries (arcade at mesosalpinx); **Lymph:** para-aortic via ovarian vessels.

Applied: **Ectopic pregnancy** most common in **ampulla**—rupture risk; **salpingitis** from ascending infections may cause infertility; **tubal ligation** commonly at **isthmus**.

6) Ovaries

Shape & size: almond-shaped ~3 x 2 x 1 cm (childbearing age); **position:** **ovarian fossa** (bounded by external iliac vessels superiorly, ureter posteriorly).

Attachments: to uterus via **ovarian ligament**; to lateral pelvic wall via **suspensory ligament (infundibulopelvic ligament)** carrying **ovarian vessels**; to broad ligament via **mesovarium**.

Blood: **ovarian artery** (aorta, below renal); **veins:** right → IVC; left → **left renal vein**.

Lymph: **para-aortic (lumbar) nodes**—key pathway for ovarian carcinoma spread.

Applied: **Ovarian torsion** (sudden pain, enlarged ovary) compromises arterial inflow/venous outflow through IP ligament; **PCOS** shows enlarged, thick tunica alboginea with multiple peripheral follicles (ultrasound correlation).

7) Broad ligament & associated folds

Broad ligament (peritoneal double fold) has **mesometrium** (uterine body), **mesosalpinx** (tube), **mesovarium** (ovary). Contents include **uterine vessels**, **round ligament**, **ovarian ligament**, **epoöphoron/paroöphoron** remnants. **Applied:** Broad-ligament fibroid, paratubal/paraovarian cysts arise within its leaves; **Gartner's duct cyst** (Wolffian remnant) may present along lateral vagina.

8) Integrating classical points

8.1 Yoni, Garbhāśaya and female-specific channels

- Females possess Garbhāśaya** as a distinct āśaya and **additional srotas** for **stanya** and **ārtava** opening externally. (Suśruta Śārīrasthāna 5 — Chapter V)
- Ārtavavaha srotas (mūla): garbhāśaya + raktavāhīnī dhāmanīs**—classical authority from Caraka: “**अर्तवस्य विसर्गश्च काले येन प्रवर्तते । तद्वाहनि ष्ठोतो ज्ञेयं गर्भाशयसमाश्रयम् ॥ तस्य मूलं रक्तवाहिन्यः स्युः गर्भाशयः स चोच्यते ॥** (च. सं. विमान 5/8)”

8.2 Marma-saṅgraha around the female breast-pelvis (for applied caution)

Suśruta's **Marma-vibhāga** includes **stana-mūla/stana-rohita**, **basti**, **guda**, **nābhi**, **vaṅkṣaṇa**, **kukundara**, etc.; obstetric-gynecologic procedures must respect these vital zones to avoid **grave bleeding/functional loss** (e.g., suprapubic approaches, perineal repairs). (Śārīrasthāna 6 — Marma chapter)

9) Blood, lymph & nerve

Organ	Arterial supply	Venous drainage	Lymphatic drainage	Nerve (pain pathway)
Vulva (labia, clitoris, vestibule)	Internal pudendal; external pudendal (mons/labia)	Pudendal plexus → internal pudendal v.	Superficial inguinal (most of vulva)	Pudendal (S2-S4)
Vagina	Vaginal, uterine, internal pudendal	Vaginal plexus → internal iliac v.	Upper 2/3 internal iliac; Lower 1/3 superficial inguinal	Upper: visceral; lower: pudendal
Uterus (fundus/body/cervix)	Uterine ± ovarian	Uterine plexus → internal iliac v.	Fundus → para-aortic & superficial inguinal (round lig.); Body → external iliac; Cervix → internal iliac & sacral	Fundus: T12-L2; Cervix: S2-S4
Tubes	Uterine & ovarian (arcade)	Ovarian/uterine plexuses	Para-aortic	Visceral afferents
Ovaries	Ovarian (aorta)	Rt ovarian → IVC; Lt → left renal	Para-aortic	Visceral afferents (T10-T11)

10) High-yield applied anatomy set

- Prolapse prevention & repair:** understand **perineal body** plus **cardinal-uterosacral complex**—failure yields cystocele/rectocele/uterine descent. Restoration of these is the core of site-specific repairs.

2. **Ureter at risk:** during hysterectomy near **uterine artery** and at **cardinal ligament**; always recall "**water under the bridge.**"
3. **Ectopic pregnancy: ampullary** most common; rupture into **pouch of Douglas** → referred shoulder tip pain (phrenic irritation); posterior fornix tap can reveal non-clotting blood.
4. **Pudendal block & episiotomy:** landmark **ischial spine**; mediolateral incision avoids anal sphincter.
5. **Cervical screening:** sample **transformation zone**; persistent high-risk HPV affects this zone.
6. **Lymph routes to memorize:** ovarian cancers → **para-aortic nodes** early; **uterine fundus** also has a **round-ligament channel to superficial inguinal** (exam favourite).
7. **PCOS & infertility:** enlarged ovaries with stromal hyperplasia; tubal patency & endometrial receptivity are assessed together (HSG/sonosalpingography) in modern work-up—map them conceptually to **ārtavavaha** channel health.
8. **Obstructed labour & fistula:** protection of **perineal body** and judicious **episiotomy** prevent 3rd-4th degree tears and vesicovaginal fistulae.

11) Classical-modern synthesis lines

- **Definition line:** *Yoni = apatyapatha; Garbha-āśaya = uterine bed for reception, retention and nourishment of garbha.*
- **Orientation:** *Garbha-āśaya between basti (front) and rectal structures (behind); females have stanya/ārtava outlets.*
- **Supports list:** pelvic diaphragm + cardinal, uterosacral, pubocervical, round ligaments (write all four).
- **Supply summary:** uterine-ovarian arterial arcade; uterine artery crosses ureter; lymph of fundus to para-aortic ± superficial inguinal (round lig.).
- **Ayurvedic clincher:** *Ārtavavaha mūla—garbhāśaya + raktavāhinī* (quote Caraka 5/8) ; **marma caution** around basti/guda/stana-mūla.

12) Self-assessment

[Female Internal Genitalia Part I Quiz](#)

[3D model](#)

[Female Internal Genitalia Part II Quiz](#)

[3D model](#)

A. Short answers (60-80 words each)

1. Enumerate the **supports of the uterus** and explain their role in uterine position.
2. Describe the **blood supply and lymphatic drainage of the uterus**, highlighting implications for cancer spread.
3. Write a note on the **perineal body** and its clinical importance in obstetrics.
4. Define **pudendal nerve block** with anatomical landmarks and structures anaesthetised.
5. Explain the **Ayurvedic concept of ārtavavaha srotas mūla** and correlate with modern uterine vasculature.

B. Long answer (any one)

1. Describe the **anatomy of the internal genital organs** (vagina, uterus, tubes, ovaries) with relations, supports, and applied obstetric-gynaecological anatomy. Integrate **classical points** with appropriate citation.
2. Give a detailed account of the **external genital organs** and **pelvic floor**, their blood-lymph-nerve supply, and **clinical applications** (episiotomy, tears, nerve block).

C. MCQs

1. Lymph from **ovarian** malignancy primarily drains to:
a) External iliac b) Internal iliac c) **Para-aortic** d) Superficial inguinal
2. The **ureter** most at risk in hysterectomy lies:

a) Above the uterine artery b) **Below the uterine artery** c) Lateral to ovarian artery d) Medial to round ligament

3. **Ampulla** of tube is the commonest site for:
a) Salpingitis b) **Fertilization** c) Fistula d) Leiomyoma

4. **Pudendal nerve** arises from:
a) L1-L2 b) T12-L1 c) **S2-S4** d) S1-S2

5. **Fundal uterine lymph** reaches superficial inguinal nodes via:
a) Uterosacral lig. b) Broad lig. c) **Round ligament** d) Cardinal lig.

Answer key: 1-c, 2-b, 3-b, 4-c, 5-c.

References

Classical sources

1. **Suśruta Saṃhitā, Śārīrasthāna 5** — “The anatomy of the human body” (English translation index; includes statement that females possess **garbhāśaya** as an additional āśaya and external openings for **stanya/ārtava**).
2. **Suśruta Saṃhitā, Śārīrasthāna 6** — “Marmas (vital parts)” (names/distribution including **stana-mūla**, **stana-rohita**, **basti**, **guda**, **nābhi**, **vaṇkṣaṇa**, etc.).
3. **Suśruta Saṃhitā, Śārīrasthāna 5/51** — Devanāgarī text quoted above on direct anatomical study.
4. **Caraka Saṃhitā, Vimāna-sthāna 5/8 (Srotovimāna)** — Devanāgarī text quoted for **ārtavavaha srotas mūla**: **garbhāśaya + raktavāhini**.

Standard modern texts

- **Snell's Clinical Anatomy by Regions**; **Dutta's Gynecology/Obstetrics**; **Datta's Essentials of Human Anatomy**; **Gray's Anatomy** — for modern relations, supports, neurovascular supply, and applied procedures.

30-second recap

- **External genitalia:** labia-clitoris-vestibule-bulbs-Bartholin; supply by **internal pudendal**; lymph to **superficial inguinal**; **pudendal block** at ischial spine.
- **Vagina:** fornices; **upper 2/3 lymph to internal iliac**, lower 1/3 to **superficial inguinal**; lower 1/5 somatic (pudendal).
- **Uterus:** **A-V-A-F** position; **uterine + ovarian arteries**; **fundus lymph to para-aortic & via round ligament to superficial inguinal**; supports = **cardinal + uterosacral + pubocervical + pelvic floor + round**.
- **Tubes:** **ampulla fertilization**; ectopic risk. **Ovary:** para-aortic nodes, torsion risk.
- **Classical:** females possess **garbhāśaya** as special āśaya; **ārtavavaha** rooted in **garbhāśaya + raktavāhini**; respect **marma-kṣetra** in procedures.