Breast and Pelvic Anatomy
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The Female Breast

This bilateral organ that lies anterior to the pectoral muscles is typically asymmetrical in size. The anatomy of the breasts is quite variable in terms of the overall size including the size and color of the areola (pronounced either: a REE la or air ree O la). Size is also relative in terms of diameter and anterior projection of the nipple.

While the breast is often circular in shape, quite often there is a projection of the breasts tissue extending into the axilla. This projection is referred to as the Axillary Tail (of Spence). Beneath the skin of the breast is a layer of corium, and beneath it is what makes the greatest volume of the breast - fat lobules. There is also glandular and stromal tissue within the substance of the breast. Diving from the nipple deep into the breast are lactiferous ducts. Supporting the breasts positioning on the chest are the ligaments of Cooper. Frequently, following repeated extension and retraction of the ligaments of Cooper (during the change in breast size from pregnancy or other instances of dramatic weight/ fat changes) the ligaments become more lax thereby altering the breasts position (pre- versus post-pregnancy/ weight change).

The Female Pelvis

Description of the female pelvis can be divided into three categories: the bony pelvis, external anatomy, and internal (or surgical anatomy).

The bony pelvis consisting of bilateral iliac, ischium, and pubic bones anchored to the sacrum, results in several typical shapes. The shape most often found in adult females is the gynecoid pelvis which is of a configuration most consistent with vaginal childbirth as distinguished from the android (the typical male pelvis) or platypeloid pelvises. These “non-gynecoid” pelvises are associated with various forms of labor dystocia.

External anatomy begins with the very general area inclusive of all contained between the two inner thighs. This area is referred to as the vulva or pudendum. The pudendum contains the labia majora and the labia minora. The labia majora divides anteriorly with the clitoris. At that point of labial “division” is the frenulum. The labia minora then coalesces above the clitoris to form the prepuse anterior to the clitoris.

Immediately posterior to the clitoris is the ostia of the uretha. Sometimes visible immediately lateral, and slightly posterior, are the bilateral Skene’s (para-urethral) glands. Just within the vagina are vestiges of the hymen which are often visible as the hymenal ring. Bilaterally in the posterior vagina - near the hymenal ring - are the Bartholin’s Glands and ducts. The Bartholin’s Glands are typically only palpable or visible in pathologic conditions such as cyst or abscess formation. Throughout the vagina are circular folds centered on the long axis of the vagina. These folds called rugae become less prominent in the grand multiparous female with multiple vaginal deliveries particularly those of macrosomic babies. At the top (cephalad) of the vagina is the opening of the uterus (i.e. the uterine cervix). The appearance of the cervix also varies with parity. The multiparous cervix often has patulous (fish-mouthed) appearance.

Surgical Anatomy

The physician practicing obstetrics and/or gynecology encounters the female pelvic anatomy from two approaches: trans-abdominally (during surgery) and by way of the pudendum (during vaginal surgery, vaginal delivery of babies, and most other procedures and examinations). While there are many approaches to consider with human anatomy, it is mnemonically helpful to categorize anatomy – including that of the female pelvis. Here we will utilize the following: gross findings, vascular, nervous system and lymphatic, followed by a
commentary of clinical considerations. While the nervous and the lymphatic systems are of great importance, we will defer the discussion of those systems to a separate presentation such that there is greater clarity in the understanding of the gross and vascular anatomy.

**Abdominal Approach**

The female patient (including the obstetric patient) on the operating table undergoing surgery of the pelvis encounters the following:

- The skin incision
- Layers encountered between the skin and the peritoneal cavity
- The structures within the peritoneal cavity

While the skin is familiar to all humans including the untrained professional, understanding the last of the above (the peritoneal cavity) requires consideration of a different concept. The peritoneal cavity is likened to that of the two layers of a deflated balloon. The exterior (anterior) layer of the cavity is the parietal layer, and the inner (posterior) layer is the visceral layer. The parietal peritoneum is the innermost (posterior-most) layer of the several layers; beginning with the skin while the visceral layer acts as a covering over the pelvic organs. While the peritoneal cavity is that area between the two layers of peritoneum, the abdominal (or pelvic) cavity is not entered until the visceral layer is opened.

The layers encountered (in order) as the female patient is operated on include:

- The skin (epidermis then dermis)
- Subcutaneous layer (often containing fat)
- Muscles (including rectus abdominus and external oblique muscles)
- Aponeurosis (of the muscles). Clinicians often refer to the aponeurosis as “the fascia.”
- Parietal peritoneum

Once the peritoneal cavity is entered, the pelvic organs are visible.

The uterus has a size that varies greatly. It can vary from the size of a small plum (approximately 3 x 4 cm) to a length that can extend to the diaphragm (in the case of myomatous or gravid uterus). The uterus is divided into four segments: the fundus, the body, the isthmus (referred to as the lower segment in the pregnant uterus during labor), and the cervix (the lower inferior-most portion) that opens into the vagina.

The broad ligament is simply the visceral layer of peritoneum that covers the uterus and the structures attached to it.

The round ligament is not truly a ligament, as it is a coalescence of the visceral peritoneum forming a ligament–appearing structure between the superior–anterior surface of the body of the uterus, to the pelvic wall (exiting at the inguinal fossa).

The uterine tubes are the hollow tubes exiting the cavity of the uterus and opening into the pelvic cavity. The uterine tubes are also referred to as the “fallopian tubes” and less often “the ovarian tubes.” These tubes are integral in fertility in that it is through the uterine tubes that the ovum from the ovary enters the lateral end of the uterine tube where it joins (during conception) sperm that enters the tube having traversed the uterine cervix, and the uterine cavity. The uterine tube is found parallel to and posterior to the round ligaments. The gross appearance of the uterine tubes is similar to that of the round ligaments except for the finding of the fimbriated end of the uterine tube.
Ovaries are lateral to the fimbriated end of each uterine tube. The ovaries are “off-white” in color, cauliflower-like in appearance, oval in shape, and vary in size from as small as 1 cm in its largest dimension in the post-menopausal woman, and frequently being as large as 6 cm in the pregnant patient. The typical size of the ovary in the non-pregnant woman of reproductive age is 2 x 3 x 4 cm.

The ovaries are suspended to the pelvic wall by the “suspensory ligament of the ovary.” In clinical practice the suspensory ligament of the ovary is often referred to as the “infundibular-pelvic ligament.”

The ureter is actually contained within the pelvic cavity as it is covered by the visceral peritoneum and courses from the renal pelvis to the trigone of the bladder, passing in close proximity of the adnexa and uterus (particularly the isthmus and cervix).

The urinary bladder lies anterior to the uterine isthmus and cervix and attach to those structures. The dome of the bladder varies in its highest (superior-most) position such that it may completely cover the uterine isthmus or barely reach above the cervix.

The rectum lies immediately posterior to the uterus. The uterus is thereby “sandwiched” between the bladder and the rectum.

Clinical Correlations

The attachment of the bladder to the uterus is often influenced by prior surgery, such that the bladder may be more firmly attached (and more difficult to separate) and in a more cephalad position following a previous cesarean delivery or deliveries.

Injury to the ureter is to be avoided during pelvic surgery and best avoided if it is visually identified. The ureter can, at times, be distinguished from similar appearing vascular structures by the appearance of peristalsis of the ureter when it is touched - while vascular structures pulsate (arteries) or fail to demonstrate peristalsis. The ureter takes a course over (anterior to) the internal iliac artery, then courses adjacent to the uterus and cervix under (posterior to) the uterine artery.

In making a surgical incision in the skin, various terminal branches of named blood vessels may be encountered. The most prominent (and named) blood vessel that may be encountered when making a transverse incision in the skin of the lower abdomen are the inferior epigastric arteries at the lateral extents of the incision. The subcutaneous fat varies in thickness from being barely perceivable (measured in millimeters) to as thick as a foot or more in length in the very obese patient. In the obese patient, the surgical length of the apo-neuronal incision may be considerably shorter than the length of the incision in the skin such that a conically shaped approach to the abdomen/ pelvis may make surgery in the obese patient more challenging.

Vascular

The blood supply to the pelvis begins as the femoral arteries – the bifurcation of the aorta. The femoral artery continues as the (common) iliac artery when it passes the inguinal ligament (merely a name change at this point). The common iliac then divides into the external and internal iliac arteries. The internal iliac artery is also referred to as the “hypogastric artery.” The internal iliac gives rise to the uterine arteries, which have both ovarian and vaginal branches. There are also vaginal branches directly from the internal iliac anastomosing with branches from the uterine arteries. The lower vagina is supplied by branches of internal pudendal arteries and
also a branch of the internal iliac. The ovaries also have branches directly from the aorta (arising via the suspensory ligament of the ovary).

Clinical Correlations

In instances of post-partum hemorrhage, ligation of the uterine arteries or the internal iliac arteries may become necessary in an effort to avoid a hysterectomy. Identification of the internal iliac artery may be more difficult that identification of the uterine artery in the instance of active hemoperitoneum.

Hysterectomy without the removal of the ovaries may lead to diminished ovarian function by virtue of decreased ovarian perfusion with concomitant ligation of the ovarian branches from the uterine arteries. Further with ligation of uterine blood vessels during hysterectomy.

Vaginal Approach

The gross anatomy, from a perspective beginning with the vulva, is encountered by the woman’s healthcare clinician during routine examination, obstetric care, and vaginal surgery such as vaginal hysterectomy.

The vulva (also called the pudendum) is the area bounded by the symphysis pubis (with its fat pad); the mons pubis overlying it anteriorly, the anus posteriorly, and the inner thighs laterally. The vulva therefore includes all the external female genitalia.

The labia of the vagina are divided into major and minor components named the labia majora and labia minora. The labia majora are typically more pronounced in girls and women who have not had a vaginal delivery of a baby.

The labia minora defines the boundaries of the vaginal introitus. The anterior labia minora divide into the prepuce covering the clitoris and the frenulum underlying the clitoris. The urethra lies directly posterior to the frenulum of the labia minora.

Clinical Correlations

Recall that the blood supply to the vagina and the cervix are via vaginal branches of the uterine arteries and internal pudendal arteries. The bladder adheres (via endopelvic fascia) to the anterior cervix and lower uterine isthmus and surgically must be detached from those structures prior to removal of the cervix/uterus.

During speculum examination of the patient’s vagina, recall that the vagina is nearly parallel to the examination table, and not until the speculum is toward the cephalad most portion of the vagina, does it take a more posteriorly angled position.