Pelvic Inflammatory Disease

PID is a generic term referring to inflammation of pelvic and adnexal structures. The cause is most frequently a bacterial infection which begins in the vagina and ascends through the cervix and endometrial cavity into the pelvis. Common causative organisms include: Chlamydia, Neisseria gonorrhea, Bacteroides, Peptostreptococcus and E. coli. The inflammation may be localized or it may diffusely involve all pelvic organs. PID predisposes women to infertility, tubal scarring, and ectopic pregnancy.

The destructive effect of bacteria on the tubal lining results in the breakdown of tissue and the accumulation of pus within the lumen of the fallopian tube (PYOSALPINX).

Hydrosalpinx

Hydrosalpinx is defined as the collection of fluid within a scarred or obstructed fallopian tube. The most frequent cause is the replacement of pus by serous fluid in cases of documented pelvic inflammatory disease (PID).

PID occurs in stages:

- **STAGE I**  early PID or endometritis
- **STAGE II**  salpingitis with or without pyosalpinx
- **STAGE III**  severe PID with tubo-ovarian abscess (TOA) or pelvic peritonitis
- **CHRONIC**  long-standing, subacute condition which follows acute PID.

Clinical Findings:

A broad spectrum of non-specific complaints, which include:

- Fever
- Leukocytosis
- Lower abdominal pain
- Pelvic tenderness, usually bilateral and diffuse
- Constant dull pain worsened by sexual activity (DYSpareunia)
- Purulent vaginal discharge
- Vaginal bleeding
**DIAGNOSTIC VARIANTS:** While sonography cannot always differentiate among the various pathologic stages of PID, the following general criteria can be useful:

**STAGE I**
- Non-specific
- Prominent, hyperechoic endometrium
- Diffuse hypoechogenicity of the uterus
- Indistinct borders of pelvic structures
- Fluid in the posterior cul-de-sac

**STAGE II**
- Pyosalpinx
- Tubular adnexal cystic masses
- Complex adnexal masses
- Shaggy tubal walls
- Usually unilateral but may be bilateral

**STAGE III**
- Presence of large, complex masses within one or both adnexae
- Indistinct walls surrounding the mass
- Internal septations
- Complex internal echo patterns

**CHRONIC**
- Same as for hydrosalpinx (see above)

**ENDOMETRIOSIS**
Endometriosis is defined as the presence of functional endometrial tissue outside the endometrium. Implants may occur anywhere within the pelvis and may be small and undetectable or large and palpable. Implants are most commonly found in the:

- Ovary
- Fallopian tube
- Broad ligament
- Posterior cul-de-sac
- Bowel and bladder

Endometriosis is a benign proliferative disease yet can cause extreme pain, discomfort and may impact the patient's quality of life. Endometriosis is more common in Caucasian women of higher socioeconomic status who postpone having children until later in life.
PATHOLOGY:
- Cysts which develop on ovaries (endometriomas) range from 1mm - 10cm and may contain old, hemolyzed blood (CHOCOLATE CYSTS)
- Gross appearance varies widely depending upon the location and extent of disease
- Common sites include ovary, cul de sac and uterosacral ligaments
- May implant on uterosacral ligaments, the cul de sac, broad ligaments, posterior surface of the uterus, rectosigmoid colon, and the round ligament

CLINICAL FINDINGS:
- Pain
- Infertility
- **4 D's of endometriosis**
  - Dysmenorrhea - painful menses
  - Dyspareunia - painful intercourse
  - Dysuria - difficult urination
  - Dyschezia - difficult defecation

SONOGRAPHIC FINDINGS:
- Well-defined, unilocular or multilocular masses, often diffusely homogenous with low-level echoes (endometriomas, chocolate cysts)
- Occasionally echo patterns of implants may be solid, cystic or complex
- "Chocolate cysts" are uniformly echogenic and may be contiguous with an ovary
- Obliteration of pelvic tissue planes
Pediatric Sonography

Normal Anatomy

Sonographic Findings:
- Cervix is twice the diameter of the corpus
- Cervix represents 2/3 of total length
- 2 - 3 cm in length, .5 - 1 cm AP
- Maintains infantile appearance until about age 7

Precocious Puberty

True precocious puberty results from an early but normal pattern of gonadotropin secretion from the pituitary. It may be a sign of hypothalamic disease.

Precocious pseudopuberty is caused by abnormal exposure to estrogen and results in the development of secondary sexual characteristics without gametogenesis.

Hydrocolpos

Hydrocolpos is a generic term for the collection of fluid, blood or pus within the vaginal or uterine cavity. The specific location and type of fluid is described by combining the following word roots:

- hemato = blood
- pyo = pus
- hydroy = water
- metro = uterus
- colpos = vagina

For example:
- hydrometrocolpos = fluid in the uterus and vagina
- hematometrocolpos = blood in the uterus and vagina

Hydrocolpos is typically found in young females and is frequently associated with the presence of imperforate hymen, vaginal septum or any acquired obstructive lesion of the vagina. It may also be seen in older women patients especially those undergoing radiation therapy. In young girls, this condition frequently goes undetected until the beginning of menstruation, however, occasionally the patient will present with a lower abdominal mass.

Sonographic Findings:
- Hypoechoic distention of the endometrial cavity and/or vagina
- Posterior acoustic enhancement
- Internal echoes may be present and represent debris or clot
- Hydronephrosis may be present in cases of severe obstruction
- Attempt to identify other genitourinary anomalies

Neonatal uterus

Uterus in 7 year old

Sagittal sonogram demonstrating a uterine blood-fluid level in a patient with an imperforate hymen
Time: 5 minutes

1. A longitudinal sonogram through a full urinary bladder reveals a small, well-circumscribed anechoic structure in the wall of the cervix. This most likely represents:
   a. Gartner's duct cyst
   b. nabothian cyst
   c. cervical carcinoma

2. A collection of blood confined within the uterine cavity is termed:
   a. hydrocolpos
   b. hydrometra
   c. hematometra
   d. hematosalpinx

3. All of the following are considered functional cysts except:
   a. cystadenoma
   b. follicular cyst
   c. corpus luteum cyst
   d. theca lutein cyst

4. All of the following are typically benign ovarian tumors except:
   a. teratoma
   b. Brenner tumor
   c. fibroma
   d. thecoma
   e. dysgerminoma

5. A patient presents with leukocytosis, a temperature of 103 degrees and right adnexal pain. Sonography reveals the presence of a complex mass in the right adnexa. The most likely diagnosis is:
   a. pelvic inflammatory disease
   b. ectopic pregnancy
   c. endometriosis
   d. ovarian dermoid

6. Post-menopausal vaginal bleeding may be caused by any of the following except:
   a. endometrial polyps
   b. endometrial carcinoma
   c. theca lutein cysts
   d. hormone replacement therapy

7. A biological tumor marker found in the blood of approximately 75% of women with ovarian cancer is:
   a. serum beta hCG
   b. CA 125
   c. PSA
   d. AFP