EVALUATION OF PELVIC MASSES

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1. General Considerations:

- Pelvic masses are common in women of all ages.

- Pelvic masses may be gynecologic as well as non-gynecologic in origin and may be detected during a routine gynecologic exam, found upon examination of a specific complaint, or found incidentally during radiologic evaluation of the pelvis.

- The age of the patient dictates the type of evaluation as different kinds of pelvic masses present during the reproductive years vs during menopause.

- The first question to answer is whether the mass is significant. If the patient has no complaints and the mass is found incidentally on routine pelvic exam, and the mass is soft and easily deformed by the examining fingers, consideration should be given that the mass represents stool in an adjacent loop of bowel. Asking the patient to take metamucil for a few days before returning for repeat pelvic examination can avoid a costly and unnecessary evaluation.

2. Age-Related Differential Diagnosis of the Pelvic Mass:

Reproductive Age-Group

- After menarche, adnexal masses will most likely be follicular or corpus luteum cysts of the ovary. Follicular cysts arise during normal ovarian function, when a mature follicle fails to rupture at ovulation or from bleeding into the follicle at ovulation. Corpus luteum cysts result from hemorrhage within a persistent mature corpus luteum. They can attain a larger size than follicular cysts (5-10 cm) and are more likely to cause a dull, aching unilateral pelvic pain. When corpus luteum cysts rupture or bleed, they may cause abrupt severe pelvic pain.

- If the pregnancy test is positive in a patient with a pelvic mass, possibilities include intrauterine pregnancy, ectopic pregnancy (see related article in this Handbook) or much less commonly, trophoblastic disease.

- Neoplasms are rare but the most common neoplasm in this age group is the benign cystic teratoma or dermoid cyst. They are usually 5-10 cm in diameter and in 15% of cases, are bilateral. They are slow growing and usually the patient is unaware of their existence. They may contain teeth, hair, sebaceous material and neural elements.

- Fibroids can be found in the uterus, ovary, cervix, pelvic ligaments or other pelvic organs. They occur in 30% of premenopausal women and are 3x more common in blacks. Symptoms include pelvic pain, bladder pressure, dysmenorrhea and menorrhagia. Their size can vary from mm to absolutely huge masses filling the entire abdominal cavity. Leiomyosarcomas can occur in these tumors but these are very rare (<0.1%), usually presenting at age 50-55.

- If the patient has severe pelvic pain, an adnexal mass and a negative pregnancy test, consideration should be given to the diagnosis of ovarian torsion. Here the ovary twists on itself (usually because of an ovarian cyst) causing pain which may wax and wane initially but will remain constant and severe once it has completed torsion. Complete torsion is a surgical emergency and if not corrected, will require oophorectomy.

- Endometrial implants outside the uterus may develop in patients with endometriosis. Endometriosis most commonly occurs in white, nulliparous women between the ages of 35-45. These implants may occur on the ovaries and occasionally can form large cysts filled with chocolate colored, syrupy fluid. These cysts are called “chocolate cysts” or endometriomas. Patients usually have sx such as cyclic pelvic pain or pressure and/or dyspareunia.

- In salpingitis, the fallopian tube becomes distended with pus forming a hydrosalpinx which is detected on physical examination as a tubular adnexal mass. The ovary may become involved in a tubo-ovarian abscess (TOA). Generally, the patient will be febrile and complaining of pelvic pain.

- Sertoli-Leydig cell tumors, ovarian neoplasms, adrenal neoplasms, and polycystic ovary syndrome (PCOS) can cause masculinization or defeminization to varying degrees. These changes include hirsutism, clitoral enlargement, frontal balding, acne, coarsening of the voice, and enlargement of shoulder girdle muscles. Occasionally, the enlarged ovaries in PCOS can be detected on physical examination.

- Granulosa cell tumors can cause increased feminization with precocious puberty, menorrhagia, or post-menopausal bleeding.

Perimenopausal or Postmenopausal Age-Group

- Gynecologic masses may still occur.
- Generally, fibroids regress as estrogen levels wane.
- Endometrial implants also decrease in size and symptomatology. Hormone replacement therapy does not seem to alter this regression.

- Functional cysts become less common as the ovary ceases to function. Any enlarging pelvic mass in this age-group should be promptly investigated as cancer is likely.
- Ovarian cancer is rare before age 40. The risk of ovarian cancer increases with age:
    - 4:100,000 age 25-29
    - 15.7:100,000 age 40-44
    - 54:100,000 age 75-79
    - Risk increases if one first-degree relative has ovarian cancer (risk increases from 1.4% to 5%. Women who have 2 or more first degree relatives with ovarian cancer have a 7% lifetime risk of developing ovarian cancer.
    - Unfortunately, most women are diagnosed at an advanced stage. 75% of women with stages I or II disease can be cured but this falls to 5-15% for women with more advanced disease.

- Cancers in other organs should be considered as well. Colon cancer causes 30,000 deaths annually in the USA, more than twice the number of deaths due to ovarian cancer. Change in bowel habits, rectal bleeding, and/or abdominal/pelvic pain and constitutional symptoms should trigger evaluation with colonoscopy. Breast cancer can metastasize to the ovary as can uterine and colon cancer. A careful breast exam and rectal exam, fecal hemoccults, and mammography are helpful in detecting these cancers. Family history is helpful as well as all of these cancers tend to run in families.

3. History:

- Patient history can be extremely helpful in directing the work-up of pelvic masses.
- Menstrual history:
    - Secondary amenorrhea suggests pregnancy or ectopic pregnancy.
    - A midcycle mass should suggest a follicular cyst.
    - A patient who complains of pelvic pain in the second half of the menstrual cycle could have a hemorrhagic corpus luteum cyst,
    - Oligomenorrhea, hirsutism, obesity in a woman with bilateral adnexal masses could have PCOS.
    - PID most commonly presents 7-10 days after menstruation.

- Contraceptive History:
    - OC's reduce the likelihood of functional cysts but do not eliminate that possibility.
    - Patients who do not use barrier contraception and who have multiple sexual partners are more likely to have PID.
- Character of the Pain
    - Sudden onset of severe pain suggests ovarian torsion, hemorrhage into a cyst, rupture of a cyst, abscess or ectopic pregnancy. Don't forget about the possibility of a ruptured appendix. Occasionally the patient will describe the onset of the pain during extreme physical exertion or intercourse.
    - Cyclic menstrual pain associated with menorrhagia and passing clots suggests fibroids whereas cyclic menstrual pain associated with back pain or a heavy pelvic sensation suggests endometriosis. Dyspareunia also occurs with endometriosis.
    - The pain of PID may be more chronic and may be associated with fever, dyspareunia, and difficulty walking.
    - Progressively worsening pain associated with constitutional symptoms suggests a cancer. Often ovarian cancer patients present only with vague gastrointestinal complaints.

4. Physical Examination:

- **General**: Look for signs of defeminization or masculinization, cachexia; an elevated temperature suggests TOA or torsion
- **Breast and axillae**: Examine carefully for fixed, hard masses.
- **Abdomen:** Look for ascites. Some masses may be large enough to palpate through the abdominal wall.
- **Pelvic:** Evaluate the characteristics of all masses including size, shape, mobility, consistency.
    - Clitoral enlargement
    - Cervical discharge with mucopus (PID)
    - Adnexal masses or tenderness
    - Cervical motion tenderness
    - Uterine enlargement

- **Rectovaginal area:** Assess the posterior uterine surface, the uterosacral ligaments, and the rectum. Check fecal hemoccult.

- **Lymph nodes:** Check cervical, supraclavicular, axillary, and groin nodes

5. Imaging Studies*:*

- **Plain films** are generally not useful as they don't adequately define soft tissue structures.

- **Ultrasound**: This procedure is the diagnostic test of choice in evaluating pelvic masses and may diagnose > 90% of pelvic masses (highly operator dependent, however)

  Advantages of ultrasound are:

  - no ionizing radiation
  - relatively low cost compared with other techniques
  - widespread availability
  - excellent at defining fluid-filled structures (80% of ovarian masses are fluid-filled). Mass can be categorized as solid, simple cyst or complex cyst. Solid masses must be evaluated further by CT or MR. Simple cysts > 3 cm should be re-evaluated in 1-2 menstrual cycles. Complex cysts require further evaluation.
  - the procedure is dynamic (for example, the bladder may be filled or emptied to enhance imaging or the patient may be repositioned)
  - the transducer itself can detect the area of tenderness allowing for focused imaging

- **Transabdominal scanning** may be compromised by bowel gas or abdominal wall obesity.
- **Transvaginal scanning** presents a more limited view of the pelvis but excellent imaging of gynecologic structures. Normal ovaries should be about 3.5 x 2 x 1.5 cm in the premenopausal woman and about 1.5 x 0.7 x 0.5 cm within 2-5 years after menopause.
- **Transvaginal Color Doppler** assesses resistance to blood flow in pelvic mass blood vessels. Vessels associated with tumors tend to have abundant, disorganized AV anastomoses with decreased resistance to blood flow. The Doppler calculates a pulsatility index which is a measure of resistance to blood flow within the mass. A value of < 1 may indicate a malignancy. Because reliability is affected by numerous factors, this technique is not widely used.

- **CT:**

Advantages:

- Less operator-dependent than ultrasonography
- Has excellent spatial resolution
- Easily detects calcifications
- Can be useful in image-guided biopsy, aspiration or drainage of an abscess
- Can assess nodal tissue, ascites and bowel involvement in cancer

Disadvantages:

- More costly than ultrasonography
- Ionizing radiation
- Requires IV contrast to enhance soft tissue resolution

- **MRI**

Advantages:

- Anatomic detail and soft tissue contrast the best of all three techniques
- No ionizing radiation
- May be helpful in defining indeterminant masses found on US
- Particularly useful in identifying fatty or hemorrhagic components to masses
- Superior to CT and US in defining mullerian abnormalities in adolescents

Disadvantages:

- Cost
- Not as widely available as US
- Not ideal for defining adnexal structures with MR signals similar to ovary

Characteristics of Benign vs. Malignant Adnexal Disease[1]

	Benign	**Malignant**
Patient age	Reproductive age	Peri or post menopausal
Location	Unilateral	Bilateral
Consistency	Cystic	Solid or mixed
Size	5 cm	> 5 cm
Shape	Smooth	Irregular
Mobility	Freely movable	Fixed
Pain	Present	Absent
Doppler Pulsatility Index	> 1	< 1

[1]from Russell, D The Female Pelvic Mass, Diagnosis and Management, *Medical Clinics of North America, 1995; 79: 1489.*

6. Laboratory Tests:

- Urinary beta hCG or serial quantitative beta hCGs for ectopic pregnancies; serum beta hCG may be found in nonpregnant patients with embryonal cell CA or chorioCA.
- Elevated WBC may be useful in diagnosing PID
- Probes for gonorrhea/chlamydia are important for dx of TOA
- Alpha-fetoprotein can be found in embryonal cell CA, mixed germ cell CA, and rarely in immature teratomas
- CA 125 (cancer antigen 125) should be used only during certain circumstances. It is expressed by epithelial cells on ovarian tumors but also on normal as well as abnormal tissues of mullerian origin. It is more useful in menopausal patients than in adolescent patients. It may be elevated in:

    - Endometriosis
    - Adenomyosis
    - Fibroids
    - Pregnancy
    - Diverticulosis
    - Cirrhosis
    - PID

CA 125 is rarely elevated beyond 100 to 200 U/ml in patients with the above conditions (normal is < 35 U/ml).

CA 125 is also elevated in cancers of:

- Ovary
- Lung
- Pancreas
- Breast
- Colon/rectum

CA 125 is elevated in 80% of all pts with serous cystadenocarcinomas of the ovary but in only 50% of patients with stage I disease.

CA 125 levels > 35 units/ml in a post-menopausal patient with an ovarian mass should be considered strongly suggestive of cancer.

7. **Some Specific Conditions:**

- **Non-neoplastic Masses**:

1. Functional and hemorrhagic ovarian cysts. These cysts can usually be followed by serial US and 90% will resolve or decrease in size. If the cyst persists beyond 9 weeks, it is probably not a functional cyst:

a. follicular cysts form in the first half of the cycle, are simple by US, usually measure 2-3 cm just before ovulation, resolve after ovulation but if ovulation does not occur, may persist and grow
b. corpus luteum cysts occur after ovulation, can be as large as 6 cm, may persist beyond the 2 week luteal phase; hemorrhage may occur into it

2. Torsion: Adnexal masses predispose the ovary or tube to twist on its pedicle, compromising the blood supply and causing ischemia and pain. If untreated, complete torsion can lead to necrosis. Abdominal pain is universal (severe, dull, or recurrent sharp pain on a background of dull discomfort). Nausea and vomiting and anorexia may occur. Fever may be present and tender masses may be found on exam; WBC may be elevated. US is helpful if it shows a tender swollen ovary with prominent follicles; a twisted pedicle may be evident. Doppler flow or absence of doppler flow are also helpful. Suspected torsion must undergo surgical evaluation.
3. Tubo-ovarian abscess (TOA): Fever, pain, and leukocytosis with a positive GC or chlamydia screen help distinguish this condition. IV Abs (see Rx of STDs in this Handbook) are the TOC but surgical drainage may be required.

4. Ectopic pregnancy: Abdominal pain, adnexal mass and a positive beta-hCG raise suspicion of this condition. See diagnostic algorithm elsewhere in this handbook.
5. Other: Mullerian abnormalities, endometriomas (usually found in patients with endometriosis), hydrosalpinx (asso with previous PID)

- **Neoplastic Masses:** These are rare in young adults but encompass germ cell tumors (teratoma, dysgerminoma, endodermal sinus tumor, embryonal CA, choriocCA, gonadoblastoma, mixed germ cell tumor), epithelial tumors (serous or mucinous cystadenoma, cystadenoCA) and sex-cord stromal tumors (granulosa-theca cell, fibroma, Sertoli-Leydig cell)

7. Management

- Laparoscopy is used less now that we have excellent imaging studies to follow patients. Functional cysts in the premenopausal woman which are < 10 cm, freely movable, smooth, mildly tender, and have the appearance of a simple cyst on US can be followed into the next menstrual cycle and reassessed on day 10 or so (70% resolve spontaneously) or alternatively, the patient can be started on a monophasic oral contraceptive. (See Figure at the end of this document) More recent studies suggest that OCP's do not hasten resolution of functional cysts, 95% of which will have resolved by 6 weeks.

- Large adnexal masses (> 10 cm) in the premenopausal woman or masses with characteristics of malignancy (solid or mixed solid and cystic on US) should be followed closely and if enlarging, a referral should be made.

- Ovarian cysts in the postmenopausal woman should be carefully evaluated as detailed in the figure at the end of this document. Remember, because the ovary ceases to function, follicular cysts are uncommon in the postmenopausal woman.

- Asymptomatic or minimally symptomatic fibroids may be followed; symptomatic fibroids may require hormonal suppression, myomectomy or occasionally hysterectomy.

- Ascites requires further diagnostic work-up as it may be associated with malignancy.

- Ectopic pregnancy requires immediate referral.

- Tubo-ovarian abscess and hydrosalpinx in cases of PID are best managed through hospitalization.

8. **Indications for surgery:**

1. urgent or emergent:

- torsion
- ectopic pregnancy
- appendiceal abscess
- ruptured TOA
- hemorrhagic cyst with hemodynamic instability

2. nonemergent:

- simple cyst

1. persistent longer than 9-12 weeks, size > 3 cm
2. enlarging on followup imaging
3. mass effect or pain

- complex mass

1. persistent longer than 9-12 weeks
2. features consistwnt with dermoid, endeometrioma, CA
3. mass effect or pain

- solid mass
- mullerian anomaly with obstruction

References:

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