

## **BENIGN OVARIAN TUMORS**

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**Abstract:** Benign ovarian tumors are slow-growing solid masses in or on a woman's ovary. Ovarian tumors are most often benign, however, some types may develop into ovarian cancer if left untreated. Symptoms are rare and tumors are usually detected during a routine pelvic exam or Pap test. Treatment typically involves surgical removal of the tumor and sometimes the surrounding tissue or the affected ovary. Fertility is often preserved after treatment. An ovarian tumor is a slow-growing abnormal mass of tissue on or in a woman's ovary. A tumor is a solid mass, unlike a fluid-filled ovarian cyst. Tumors, which occur in many areas of the body, are abnormal growths that don't have any purpose. A tumor can be benign or cancerous (malignant), but ovarian tumors are typically benign.

**Keywords:** sign of benign ovarian tumors, forms of sign of benign ovarian tumors, types of sign of benign ovarian tumors, treatments for sign of benign ovarian tumors.

For information on cancerous ovarian tumors, read ovarian cancers.

Benign ovarian tumors most commonly occur in women of childbearing age. They occur in about 50 percent of women with irregular menstruation and in about 30 percent of women with regular menstruation.

Benign ovarian tumors are divided into three main types, based on where the abnormal cell growths originated:

- **Surface epithelial tumors**—these tumors begin in the cells lining the surface of the ovary. It is the most common type of ovarian tumor.

- **Stromal tumors**—these benign and malignant tumors begin in the part of the ovary that manufactures female reproductive hormones. It is very rare and when cancerous is considered a low-grade cancer.

- **Germ cell tumors**—these tumors begin in the cells that develop into eggs. The majority of germ cell tumors are benign, but sometimes can develop into cancer. These are most common in younger women and, if treated early, fertility can be preserved.

### **Risk factors for ovarian tumors**

The causes of benign ovarian tumors are not well understood. Some research suggests correlations between certain risk factors and the development of ovarian tumors:

- Obesity
- Infertility
- Family history of ovarian tumors or ovarian cancer

### **Ovarian tumor symptoms and diagnosis**

Ovarian tumors are generally asymptomatic, meaning a woman rarely has any noticeable symptoms. In some women, the tumor is so undetectable that it eventually grows large enough to cause pelvic or abdominal discomfort by encroaching on nearby organs. In these cases symptoms may include:

- Abdominal pain
- Trouble urinating or frequent urination
- Low back pain
- Pain with sexual intercourse

- Bad cramps with a woman's periods
- Feeling full quickly after eating, or no appetite
- Nausea or vomiting

Since symptoms are rare, tumors are usually spotted during routine physical exams, including a pelvic exam or Pap test. As such, women should always have routine pelvic exams to help ensure that changes in the ovaries are diagnosed as early as possible.

#### **Ovarian tumor removal and treatment**

In some cases, benign tumors need no treatment; doctors may simply use "watchful waiting" to make sure they cause no problems.

When ovarian tumors are present and don't go away, when they are painful, and when they grow, they are usually treated with surgery, such as laparoscopy to remove the tumor. For larger ovarian tumors, surgeons may perform a laparotomy, and if the tumor is malignant (cancerous), the surgeon may selectively remove part or all of the abnormal growth. This process is called ovarian tumor debulking.

Some ovarian tumors are removed while leaving the rest of the ovary intact. Other times the surgeon may remove the entire affected ovary and Fallopian tube. Rarely, both ovaries are removed.

Removing one ovary will not affect the normal function of the remaining ovary. So hormone effects (pubertal change, menstruation) and reproductive capacity of the other ovary should be unaffected.

#### **General information.**

Benign adnexal masses are masses of the ovarian and or fallopian tube and include functional cysts (eg, corpus luteum cysts) and neoplasms (eg, benign teratomas). Most are asymptomatic; some cause pelvic pain. Evaluation includes pelvic examination, transvaginal ultrasound, and sometimes measurement of tumor markers. Treatment varies depending on the type of mass; surgery with cystectomy or oophorectomy is done if the mass is symptomatic or cancer is suspected.

Ovarian cysts or other ovarian masses are a common gynecologic issue. Functional cysts, which develop as part of the menstrual cycle, are common and usually resolve without treatment. Masses that are symptomatic or do not resolve may need to be removed surgically to be treated and checked for ovarian cancer.

#### **Types of Adnexal Masses**

Types of adnexal masses that occur in reproductive-age and postmenopausal women are mostly the same. However, certain masses are stimulated by estrogen. Some estrogen-sensitive masses occur only during reproductive age, because they develop and resolve with the menstrual cycle (eg, follicular ovarian cysts, corpus luteum cysts). Other estrogen-sensitive masses begin to develop during reproductive age and typically decrease in size or resolve after menopause (eg, ovarian endometriomas).

#### **Ovarian masses include:**

- Benign, non-neoplastic masses: functional ovarian cysts (follicular or corpus luteum cysts), endometriomas, polycystic ovaries, theca lutein cysts (usually due to ovulation induction during infertility treatment)
- Benign neoplasms: fibromas, cystadenomas, benign cystic teratomas
- Paraovarian cysts
- Ovarian tumors of low-malignant potential (borderline tumors)
- Ovarian, fallopian tube, or peritoneal cancers

#### **Fallopian tube masses include:**

- Ectopic pregnancies implant most commonly in the tubes, but can also implant in the cervix, cornua of the uterus, ovaries, abdomen, or uterine scar
- Hydrosalpinges
- Tubo-ovarian abscesses: involve the tube and ovary and sometimes other pelvic structures (eg, intestines, bladder)
- Paratubal cysts
- Ovarian, fallopian tube, or peritoneal cancer

#### **Functional ovarian cysts**

There are 2 types of functional cysts:

- **Follicular cysts:** These cysts develop from graafian follicles (fluid-filled sacs that contain ova and are located in the ovaries).
- **Corpus luteum cysts:** These cysts develop from the corpus luteum (which forms from the dominant follicle after ovulation). They may hemorrhage into the cyst cavity, distending the ovarian capsule or rupturing into the peritoneum.

Most functional cysts are < 1.5 cm in diameter; few exceed 5 cm. Functional cysts usually resolve spontaneously over days to weeks.

Polycystic ovary syndrome is usually defined as a clinical syndrome, not by the presence of ovarian cysts. But ovaries typically contain many 2- to 6-mm follicular cysts and sometimes contain larger cysts that contain atretic cells.

#### **Benign ovarian neoplasms**

Benign ovarian neoplasms usually grow slowly and rarely become malignant. They include the following:

- **Benign (mature) teratomas:** These are germ cell tumors; they are also called dermoid cysts because although derived from all 3 germ cell layers, they consist mainly of ectodermal tissue.
- **Fibromas:** These slow-growing connective tissue tumors are usually < 7 cm in diameter.
- **Cystadenomas:** These are most commonly serous or mucinous.

#### **Symptoms and Signs of Benign Adnexal Masses**

Most functional cysts and benign neoplasms are asymptomatic, but some cause intermittent dull or sharp pelvic pain or, infrequently, deep dyspareunia.

Hemorrhagic corpus luteum cysts may cause pain or signs of peritonitis, particularly when they rupture. Occasionally, severe abdominal pain results from adnexal torsion of a cyst or mass, usually > 4 cm.

Rarely, ascites and pleural effusion accompany ovarian fibromas; this triad of findings is called Meigs syndrome.

#### **Diagnosis of Benign Adnexal Masses**

- Transvaginal ultrasound
- Sometimes tests for tumor markers

Adnexal masses are usually detected incidentally during pelvic examination or pelvic imaging but may be suspected based on symptoms.

Transvaginal ultrasound is usually the first-line test to evaluate an adnexal mass. A pregnancy test is done to exclude ectopic pregnancy in patients with an adnexal mass and pelvic pain or abnormal uterine bleeding.

Adnexal masses can be difficult to evaluate fully with imaging alone. Simple ovarian cysts (thin, smooth walls; no solid components, septations, or internal blood flow on Doppler imaging) are almost always benign, regardless of size or the patient's menopausal status (1, 2).

Radiographic characteristics that suggest cancer include a cyst with any of the following characteristics: > 10cm; papillary or solid components (particularly those with a blood supply); irregularity; thick septations; surface excrescences; ascites; evidence of metastases.

Ultrasound can usually diagnose mature teratomas and endometriomas with a high degree of certainty; other adnexal masses may be indeterminate. If ultrasound findings are indeterminate, MRI is performed (3).

The International Ovarian Tumor Analysis (IOTA) group developed the Simple Rules to preoperatively assess risk of cancer in women who have ovarian or other adnexal neoplasms that are thought to require surgery. Classification is based on the presence or absence of 10 ultrasound features and has a higher sensitivity and specificity than other classification scores. The IOTA Simple Rules also include a risk calculation tool (SRrisk), which can be used on mobile devices (4).

Adnexal masses can be difficult to evaluate fully with imaging alone. Serum markers are measured if ovarian cancer is suspected, but sensitivity and specificity are limited. Tumor markers are more effective for monitoring response to treatment in patients with known ovarian cancer. The most commonly measured serum marker is CA 125, especially in postmenopausal women, but its use in premenopausal women requires clinical judgment. CA 125 levels may be falsely elevated in women who have endometriosis, uterine fibroids, peritonitis, cholecystitis, pancreatitis, inflammatory bowel disease, or various cancers. Another tumor marker, human epididymis protein 4 (HE4), has also been used to distinguish benign from malignant ovarian masses. If nonepithelial histopathology is suspected, beta human chorionic gonadotropin, L-lactate dehydrogenase, alpha-fetoprotein, or inhibin may be measured.

- Monitoring with serial transvaginal ultrasound for selected cysts
- Sometimes surgery (cystectomy, oophorectomy, salpingectomy)

Many functional cysts < 5 cm resolve without treatment; serial ultrasound is done to document resolution. If asymptomatic women of reproductive age have simple, thin-walled cystic adnexal masses 5 to 8 cm (usually follicular) without imaging characteristics of cancer, expectant management with repeated ultrasound (eg, every 6 to 8 weeks) is appropriate.

Benign neoplasms require treatment. Masses with radiographic characteristics of cancer require exploratory laparoscopy or laparotomy and excision.

If technically feasible, surgeons aim to preserve the ovaries (eg, by cystectomy).

Oophorectomy is done for the following:

- Fibromas that cannot be removed by cystectomy
- Cystadenomas
- Cystic teratomas > 10 cm
- Other types of cysts that cannot be surgically removed separately from the ovary
- In postmenopausal women, most cysts or masses, particularly if they are > 5 cm

If oophorectomy is performed, concomitant salpingectomy may also be performed. Indications for salpingectomy at the time of ovarian cystectomy depend on patient characteristics and the clinical context and may include the following:

- Fallopian tube mass or other pathology, if malignancy is suspected, tubo-ovarian abscess is present, or if hydrosalpinx is present in patients planning in vitro fertilization
- Ectopic pregnancy
- Opportunistic salpingectomy to decrease risk of ovarian, fallopian tube, and primary peritoneal cancer is offered to patients at average risk of these cancers who are undergoing pelvic surgery for benign indications

#### **Guidelines for Benign Adnexal Masses**

The following is a list of professional medical society or government clinical practice guidelines regarding this medical issue; this is not a comprehensive list:

- Andreotti RF, Timmerman D, Strachowski LM, et al: O-RADS US Risk Stratification and Management System: A Consensus Guideline from the ACR Ovarian-Adnexal Reporting and Data System Committee. 2020

- American College of Obstetricians and Gynecologists' Committee on Practice Bulletins—Gynecology. Practice Bulletin No. 174: Evaluation and Management of Adnexal Masses. 2016 (reaffirmed 2025).

- Expert Panel on GYN and OB Imaging, Patel-Lippmann KK, Wasnik AP, et al. ACR Appropriateness Criteria® Clinically Suspected Adnexal Mass, No Acute Symptoms: 2023 Update.

#### Key Points

- Ovarian cysts and benign ovarian neoplasms are common gynecologic issues.
- Functional cysts, which develop as part of the menstrual cycle, tend to be small (usually < 1.5 cm in diameter), to occur in premenopausal woman, and to resolve spontaneously.
- Functional cysts and benign neoplasms are usually asymptomatic, but sometimes they cause dull or sharp pelvic pain.
- Excise masses that have radiographic characteristics of cancer (eg, cystic and solid components, surface excrescences, multilocular appearance, irregular shape) or that are accompanied by ascites.
- Excise certain cysts and benign neoplasms, including cysts that do not spontaneously resolve.

Ovarian tumours can be divided into three main groups:

- Functional.
- Benign.
- Malignant.

See the separate Ovarian Cancer article. See also the separate Ovarian Tumours and Fibroids in Pregnancy article.

#### **Benign epithelial neoplastic cysts<sup>1</sup>**

- Serous cystadenoma :
  - Develop papillary growths which may be so prolific that the cyst appears solid.
  - They occur in adults of all ages, with mean ages differing from 40-60 years.
  - They are bilateral in 10-20% of cases.
- Mucinous cystadenoma:
  - The most common large ovarian tumours and which may become enormous.
  - They are filled with mucinous material and rupture may cause pseudomyxoma peritonei. They may be multilocular.
  - Mucinous cystadenomas of the ovary occur mainly in women aged 20-50, but may occur in younger women.
  - They are bilateral in 5% of cases..

#### **Benign neoplastic cystic tumours of germ cell origin**

- Benign cystic teratoma; rarely malignant.
- They arise from primitive germ cells.
- A benign mature teratoma (dermoid cyst) may contain well-differentiated tissue - eg, hair, and teeth. Can undergo malignant transformation in 1-2% of cases.<sup>2</sup>
- May be bilateral.
- They are most common in young women.
- Poorly differentiated, malignant teratomas are rare.

### **Benign neoplastic solid tumours**

- Fibroma (very few are malignant); small, solid benign fibrous tissue tumours. They are associated with Meigs' syndrome and ascites.<sup>3</sup>
- Thecoma (very few are malignant).
- Adenofibroma.
- Brenner's tumour:<sup>4</sup>
  - Rare ovarian tumours displaying benign, borderline or proliferative, and malignant variants.
  - Usually benign and mostly unilateral.
  - They may be associated with mucinous cystadenoma and cystic teratoma.

### **How common are benign ovarian tumours? (Epidemiology)**

- Benign ovarian tumours occur in 30% of females with regular menses (eg, luteal cysts as incidental findings on pelvic scans) and 50% of females with irregular menses.
- Predominantly they occur in premenopausal women; they may also occur perinatally.
- Benign ovarian tumours are uncommon in premenarchal and postmenopausal women.
- The likelihood of malignancy in women of childbearing age is low and a large proportion of cysts are of functional origin, tending to resolve over time.<sup>5</sup>
- Benign neoplastic cystic tumours of germ cell origin are most common in young women.

### **Risk factors**

- Obesity.
- Tamoxifen therapy has been associated with an increase in persistent ovarian cysts.
- Early menarche.
- Infertility.
- Dermoid cysts can run in families.

### **Benign ovarian tumour symptoms (presentation)**

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- Asymptomatic - chance finding (eg, on bimanual examination or ultrasound).
- Dull ache or pain in the lower abdomen, low back pain.
- Torsion or rupture may lead to severe abdominal pain and fever.
- Dyspareunia.
- Swollen abdomen, with palpable mass arising out of the pelvis, which is dull to percussion and does not disappear if the bladder is emptied.
  - Pressure effects - eg, on the bladder, causing urinary frequency, or on venous return, causing varicose veins and leg oedema.
  - Torsion, infarction or haemorrhage:
    - Causes severe pain.
    - Torsion may be intermittent, presenting with intermittent episodes of severe pain.
    - Ovarian torsion is a complication for persistent masses in pregnancy.<sup>6</sup>
  - Rupture:
    - Rupture of a large cyst may cause peritonitis and shock.
    - Rupture of mucinous cystadenomas may disseminate cells which continue to secrete mucin and cause death by binding up the viscera (pseudomyxoma peritonei).
    - Ascites - suggests malignancy or Meigs' syndrome.
    - Endocrine - hormone-secreting tumours may cause virilisation, menstrual irregularities or postmenopausal bleeding. This is uncommon though.

### **Differential diagnosis**

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Non-neoplastic functional cysts - eg, follicle cyst, corpus luteum cyst, theca lutein cyst.

Any other cause of pelvic pain.

Polycystic ovary syndrome.

Endometrioma.

Ovarian malignant tumour.

Bowel - colonic tumour, appendicitis/appendix mass, diverticulitis.

Gynaecological - pelvic inflammatory disease, tubo-ovarian abscess, uterine tumour (eg, fibroids), ectopic pregnancy, para-ovarian cyst.

Pelvic malignancies - eg, retroperitoneal tumours, small intestine tumours and mesothelial tumours.

### **Investigations**

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It is important that some types of adnexal cysts (such as endometrioma, mature cystic teratoma, and paraovarian cysts) are diagnosed correctly as these may affect patients' fertility, may be associated with significant pelvic disease or may put the patient at risk for ovarian torsion.<sup>7</sup>

- Pregnancy test (uterine or ectopic pregnancy).
- FBC - infection, haemorrhage.
- Urinalysis - if there are urinary symptoms.
- Ultrasound - a pelvic ultrasound is the single most effective way of evaluating an ovarian mass. Transvaginal ultrasonography is preferable due to its increased sensitivity over transabdominal ultrasound.
  - CT or MRI scan - usually required only if ultrasound results are not definitive or if intra-abdominal pathology is suspected.
  - A recent meta-analysis found that the sensitivity and specificity of MRI for correct detection of malignancy may reach 92% and 88%, respectively.<sup>8</sup>
  - Diagnostic laparoscopy may be performed in some cases.
  - Fine-needle aspiration and cytology may be used to confirm the impression that a cyst is benign.
- Cancer antigen 125 (CA 125):
  - CA 125 does **not** need to be done in premenopausal women who have had an ultrasound diagnosis of a simple ovarian cyst made.
  - CA 125 is unreliable in differentiating benign from malignant ovarian masses in premenopausal women because of the increased rate of false positives and reduced specificity.
  - Diverticulitis, endometriosis, liver cirrhosis, uterine fibroids, menstruation, pregnancy, benign ovarian neoplasms and other malignancies (pancreatic, bladder, breast, liver, lung) can all result in elevated CA 125 levels.<sup>2</sup>
  - CA 125 is primarily a marker for epithelial ovarian carcinoma and is only raised in 50% of early-stage disease.
  - When serum CA 125 levels are raised, serial monitoring of CA 125 may be helpful, as rapidly rising levels are more likely to be associated with malignancy than high levels which remain static.
  - If serum CA 125 assay is more than 200 units/mL, discussion with a gynaecological oncologist is recommended.<sup>10</sup>
  - The main use of CA 125 is in assessing response over time to treatment for malignancy.
- Lactate dehydrogenase (LDH), alpha-fetoprotein (AFP) and human chorionic gonadotrophin (hCG) should be measured in all women under the age of 40 with a complex ovarian mass because of the possibility of germ cell tumours.

**NB:** although pelvic ultrasound is highly sensitive in detecting adnexal masses, its specificity in detecting malignancy is lower.<sup>5</sup>

#### **Risk of Malignancy Index (RMI)**

There are different risk of malignancy scores which can be used to assess an ovarian mass.

- The RMI I is the most effective for women with suspected ovarian cancer. This is also recommended by the National Institute for Health and Care Excellence (NICE) guideline on ovarian cancer.<sup>11</sup> It should not be used for premenopausal women though.

- RMI I combines three pre-surgical features: serum CA 125 (CA 125); menopausal status (M); and ultrasound score (U).

- The RMI is a product of the ultrasound scan score, the menopausal status and the serum CA 125 level (IU/mL) as follows:

$RMI = U \times M \times CA\ 125$ :

- The ultrasound result is scored 1 point for each of the following characteristics: multilocular cysts, solid areas, metastases, ascites and bilateral lesions. U = 0 (for an ultrasound score of 0), U = 1 (for an ultrasound score of 1), U = 3 (for an ultrasound score of 2-5).

- The menopausal status is scored as 1 = premenopausal and 3 = postmenopausal.

- Serum CA 125 is measured in IU/mL.

- Recommendations are that those women suspected of having ovarian cancer who have an RMI score greater than 200 should have a CT of the abdomen and pelvis performed in secondary care.<sup>12</sup>

#### **Benign ovarian tumour treatment and management**

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Many patients with simple ovarian cysts based on ultrasound findings do not require treatment.

##### **Expectant management**

Women with small (less than 50 mm in diameter) simple ovarian cysts generally do not require follow-up, as these cysts are very likely to be physiological and almost always resolve within three menstrual cycles.<sup>10</sup>

Women with simple ovarian cysts of 50-70 mm in diameter should have yearly ultrasound follow-up and those with larger simple cysts should be considered for either further imaging (MRI) or surgical intervention.<sup>13</sup>

Even in postmenopausal women, as many as 80% of incidental adnexal masses will resolve over a period of several months. For those that are persistent, unchanged, less than 10 cm, and with normal CA 125 values, the likelihood of an invasive cancer is sufficiently low that observation should usually be offered.<sup>14</sup>

However, ovarian cysts that persist or increase in size are unlikely to be functional and may need surgical management.

##### **Oral contraceptives**

- The oral contraceptive pill is **not** recommended, as its use has not been shown to promote the resolution of functional ovarian cysts.<sup>15</sup> Watchful waiting for two or three cycles is appropriate and if cysts persist then surgical management is often indicated.

##### **Surgery**

If conservative measures fail or criteria for surgery are met, surgical therapy for benign ovarian tumours is generally very effective and provides a cure with minimal effect on reproductive capacity.

Persistent simple ovarian cysts larger than 5-10 cm (especially if symptomatic), and complex ovarian cysts should be considered for surgical removal.

In children and younger women (wishing to preserve maximum fertility), cystectomy may be preferable to oophorectomy.<sup>16</sup>

Laparoscopic surgery for benign ovarian tumours is usually preferable to open surgery.<sup>17</sup>

Although most adnexal masses are benign in pregnancy and usually resolve by 14-16 weeks gestation, when surgical management is chosen, laparoscopy can be safely performed.<sup>6 2</sup>

Ovarian torsion:<sup>18</sup>

Usually initially treated by laparoscopy with uncoiling of the affected ovary and possible oophoropexy.

Salpingo-oophorectomy may be indicated if there is severe vascular compromise, peritonitis or tissue necrosis.

Immediate surgical intervention is indicated for a haemorrhagic cyst.

Laparoscopy will need to be upgraded to laparotomy when malignancies are discovered.

Pseudomyxoma peritonei has been traditionally treated by surgical debulking. However, this inevitably leads to recurrence and repeated surgery. Current recommended standard treatment consists of complete cytoreduction surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC).<sup>19</sup>

### **Complications**

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- Torsion of an ovarian cyst can occur.
- Haemorrhage is more common for tumours of the right ovary.
- Rupture of an ovarian cyst can occur.
- Infertility can occur as a result of ovarian tumours or their treatment. However, the role of cysts in infertility is controversial and the effects of surgical treatment are often more harmful than the cyst itself to the ovarian reserve. Surgery does not seem to improve pregnancy rates.<sup>20</sup>

### **Prognosis**

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- This is variable and depends on the type and size of tumour, associated complications and the patient's age.
- Most small ovarian cysts in premenopausal women will resolve spontaneously.<sup>2</sup>
- Ovarian torsion: if operated within six hours of onset of symptoms, tissue will usually remain viable.<sup>18</sup>
- Prognosis of surgically removed cysts ultimately depends on the histology.

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