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Abdominal Masses in Gynecology

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INTRODUCTION

Abdominal or pelvic mass can present at any age of life. In a random sample of 335 asymptomatic women aged 25–40 years, the point prevalence of an adnexal lesion on ultrasound examination was 7.8% (prevalence of ovarian cysts 6.6%)[1]. Prevalence of pelvic masses in postmenopausal women can vary widely from 2.5%[2] to 10%[3] in postmenopausal women.

A woman presenting with an abdominal or pelvic mass might complain of various symptoms but a significant majority will have no guiding/obvious symptoms at presentation although the final diagnosis may be life-threatening. The abdomen can be distended by either a solid or cystic mass or by free fluid in the abdomen. To distinguish between masses and free fluid you must examine the patient and sometimes you will need to perform an ultrasound as described in Chapter 1.

ABDOMINAL MASSES VERSUS A DISTENDED ABDOMEN CAUSED BY FLUID

Free fluid in the abdomen can either be ascites, blood, chylus or pus. Table 1 shows the most important gynecological causes of free fluid in the abdomen. This chapter focuses on abdominal masses.

CLASSIFICATION OF ABDOMINAL MASSES

A patient with an abdominal mass may present with symptoms, but the mass might only be detected during physical examination or even only through ultrasound. This chapter deals with palpable and sonographically detectable masses as the difference between the two may only be in size but not necessarily in treatment.

Some pelvic masses typically present only sonographically, for example:

- Endometrioma
- Hydro-/pyosalpinx
- Sero-/hematometra

If you diagnose a mass in a woman's lower abdomen you must decide on:

- Which organ the tumor arises from (organ specificity). Lower abdominal masses can be divided according to their anatomical origin in genital and extragenital masses (Table 2).
- What kind of tumor you are dealing with (entity, i.e. malignant or benign).

Table 1 Common gynecological causes of free fluid in the abdomen

Free fluid	Cause	See Chapter:
Blood	Ectopic pregnancy	12
Pus	Tubo-ovarian abscess/PID/peritonitis Infected miscarriage	5 2, 13
Ascites	Peritonitis, carcinomatosis (cancer) Hyperstimulation of ovaries	26, 28–30

Table 2 Anatomical origin of abdominal masses

Genital mass	Extragenital mass
Uterine Tubo-ovarian	Gastrointestinal and pancreatic Hepato-biliary Renal and urological Mesenteric and retroperitoneal Abdominal wall herniation

This chapter will only describe in detail the diagnosis and treatment of genital masses. Please refer to surgical textbooks for further investigations and treatment of other conditions.

SIGNS AND SYMPTOMS

As was said earlier, many women with a pelvic mass will have no symptoms at all. Most symptoms are not specific for a specific organ or entity. Patients may present with:

- Feeling of heaviness or fullness in the lower abdomen.
- Acute or chronic pain.
- Bowel symptoms such as constipation or bloating.
- Urogenital symptoms: frequent micturition, urge, recurrent urinary tract infection (UTI), retention of urine.
- Increased abdominal circumference.

Genital symptoms such as abnormal vaginal bleeding, amenorrhea, dysmenorrhea or increased vaginal discharge may point to the reproductive organs as causative organs. The absence of those symptoms however doesn't exclude a genital origin of the patient's complaints.

Menstrual, bladder and bowel symptoms with or without pressure symptoms associated with a pelvic mass may point to fibroid uterus in women of reproductive age, but similar symptoms may manifest sinister disease in a postmenopausal patient. Therefore each symptom needs further evaluation, i.e. onset, duration of symptoms, character and intensity of pain or discomfort, loss of weight and appetite and limitations of daily activity etc., to achieve a differential diagnosis.

DIFFERENTIAL DIAGNOSIS

It is of utmost importance to identify those patients with a potentially life-threatening disease, as well those patients who are already in a critical condition. Table 3 gives an overview of the differential diagnosis.

It is important to have a systematic approach for assessment in order not to miss a patient with a potentially dangerous condition. The commonest mass arising from the pelvis in a woman of reproductive age is an intrauterine or old ruptured ectopic pregnancy. It is thus important to have a suspicion for pregnancy in every woman of repro-

Table 3 Differential diagnosis for pelvic/abdominal mass

Gynecological
Pregnancy–related
   Normal intrauterine pregnancy
   Old ruptured extrauterine pregnancy (abdominal, tubal pregnancy); see Chapter 12
   Molar pregnancy see Chapter 15
Uterine origin
   Uterine fibroids, see Chapter 19
   Advanced uterine carcinoma or sarcoma, see Chapter 29
   Hematometra/pyometra
Tubal origin
   Hydro–/pyosalpinx (Chapter 17 on STI)
   Tubo-ovarian abscess (Chapter 17)
   Advanced cancer of the tube
Ovarian origin
   Ovarian torsion, see Chapter 5 on acute pelvic pain
   Benign cyst
   Endometrioma, see Chapter 6 on chronic pelvic pain
   Benign tumor (dermoid, fibroma, cyst-adenoma)
   Borderline tumor
   Malignant tumor (carcinoma, granulosa cell or germ cell tumor; see Chapter 28)
   A pelvic mass associated with an upper abdominal mass may indicate advanced ovarian cancer with omental cake especially when associated with ascites

Surgical causes
Appendicular abscess
Obstructed hernia
Intussusception
Colorectal carcinoma
Subacute intestinal obstruction
Diverticular abscess
Large bowel tumor/mesenteric tumor
Abdominal aortic aneurism
Renal tumor: pelvic kidney, bladder carcinoma, urinary retention

Neurological causes
Neuroblastoma

Hematological causes
Hodgkin's and non-Hodgkin's lymphoma, pelvic spleen

ductive age coming with a pelvic mass. The most common benign gynecological mass is a leiomyoma (fibroid). Note that pelvic masses are also causes of generalized abdominal swellings or acute abdomen which may be dealt with initially by general surgeons in many countries, so sensitization of surgical colleagues is important.

HISTORY TAKING

Symptomatic assessment in regard to general health and specific systems must be carried out in a systematic fashion. It is useful to have a set pattern of obtaining a history. See general questions for gynecological history taking in Chapter 1. Questions you may want to ask are:

- Presenting complaints: onset, duration, character and intensity if pain; is it radiating to another part of the body, what makes the symptom better/worse, relationship to menstrual cycle, loss of weight, appetite, fever, bloating, frequency. Weight loss and increased abdominal circumference can indicate a malignancy. A pelvic mass with fever can point to an infectious cause of the mass such as a tubo-ovarian abscess or diverticulitis.
- *Menstrual history*: last menstrual period, abnormal bleeding (spotting, flooding, intermenstrual bleeding, amenorrhea, if yes since when?), dysmenorrhea (see Chapter 7). Irregular bleeding can point to either a pregnancy or a uterine cause of the mass, e.g. fibroids, but also to carcinoma. Secondary dysmenorrhea (i.e. not since the first period) points to endometriosis, adenomyosis and fibroids. Amenorrhea of more than 6 months together with advanced age makes menopause more likely than a pregnancy. The differential diagnosis of pre- and postmenopausal patients differ!
- *Obstetric history*: number of pregnancies and deliveries with outcome, number of present children, desire for children, current contraception. An ectopic pregnancy in the history makes a recurrence more likely. A pregnancy is likely in a woman who wants more children and doesn't use any contraception.
- *Past history*: past sexually transmitted infection (STI) symptoms, abdominal and vaginal operations, past similar symptoms and treatment, past medical diseases (e.g. tuberculosis, HIV, sickle cell disease, cancer). A history of STIs may indicate an infectious origin of a pelvic mass, e.g. tubo-ovarian abscess or pyosalpinx. Previous abdominal operations can lead to acute bowel obstruction or may point to recurrent diverticulitis. Patients with breast cancer have a higher risk for ovarian and endometrial cancer. Immunosuppression in HIV increases the risk for urogenital tuberculosis, pelvic abscess, cervical carcinoma and non-Hodgkin lymphoma.
- *Sexual history*: current relationship, number of previous partners, dyspareunia, condom use (patients may find it embarrassing so put her at ease and be comfortable yourself about these issues). Newly experienced dyspareunia can point to endometrioma in the pouch of Douglas or acute infection. A higher number of partners with inconsistent condom use makes an STI more likely.

GENERAL EXAMINATION

As indicated above you first want to know whether your patient needs immediate treatment which cannot be delayed. So after taking her vital signs to rule out shock you should assess her abdomen for signs of peritonism as described in Chapter 1: assess for rebound tenderness and guarding. Once you've ruled out peritonitis or peritonism you can continue to assess your patient to establish your diagnosis. Don't forget to check for generalized lymph node enlargement to include lymphoma and tuberculosis, but also gynecological malignancy in your differential diagnosis. Note: after routine general examination it is worth stating the patient's performance status (performance status aims at assessment of physical ability and evaluates the fitness for surgery if required; see http://en.wikipedia.org/wiki/Performance_status).

Systematic examination will be extremely important for identifying the origin and cause of abdominal mass and other undiagnosed factors that the patient may have. For example, a patient presenting with a 1-day history of nausea and vomiting may have an advanced stage ovarian or peritoneal cancer, and vomiting may be due to intestinal obstruction or this may be acute gastroenteritis. So evaluation of symptoms and individualization will help you to diagnose each condition accurately.

Abdominal examination

See Chapter 1 on how to do an abdominal examination in a gynecological patient. It is important that she empties her bladder before examination and that you make her feel safe and at ease. Look for surgical scars and obvious distentions. A confined mass has clear borders, shifting dullness rather points to free fluid in the abdomen. Assess the whole abdomen systematically in order not to miss anything. Start with the area of the abdomen where

the patient doesn't experience any pain. Once you have found a pelvic mass, the focus of examination is to identify the origin of the pelvic mass, i.e. genital or extragenital. For this you should try to assess its mobility by moving it gently in all directions. During bimanual palpation of the abdominal or pelvic mass use the hand placed on the patient's abdomen to mobilize the mass horizontally and vertically. This method will be especially helpful to identify its attachments and mobility and hence differentiate its possible origin if you lack access to ultrasound.

Speculum examination

See Chapter 1 on how to do a speculum examination. Before you introduce your speculum, inspect the vulva: do you see any hints for STIs (discharge, genital warts or ulcers)? Now introduce your speculum and inspect the vaginal wall for discharge, warts or tumor growth, and the posterior fornix of the vagina for fluid collection or the deep blue tumors of endometriosis. A bulging posterior vaginal wall may point to a mass or free fluid in the pouch of Douglas. In this case the normally sized uterus is sometimes elevated out of the true bony pelvis and is felt as a lower abdominal mass above the pubis during abdominal palpation! The same can happen with a full bladder and an anteverted uterus.

Inspect the cervix for tumor growth and ulcers, and the cervical os for pus or other discharge/blood from the os. If you find any abnormal discharge in the vagina or cevical os, take swabs for a wet mount or/and microbiological stains.

If you have problems assessing the cervical surface correctly add acetic acid and Lugol's iodine as described for visual inspection with acetic acid (VIA) and visual inspection with Lugol's iodine (VILI) in Chapter 26 on cervical cancer.

Look for indirect signs of pregnancy if you don't have a urine pregnancy test (UPT): bluish cervix and slightly darker, swollen vaginal walls. A cervix that deviates from the midline might indicate uterine fibroids but as well a large tubo-ovarian mass on the contralateral side.

Bimanual vaginal examination

See Chapter 1 on how to do a vaginal examination. As explained there, you should have a routine order of assessment. Start palpating the cervix, then the uterus, then the adnexal regions and then the pelvic mass.

Cervix Palpate the surface of the cervix for irregularities, its size, mobility and tenderness. An irregular surface points to carcinoma. A bulky, eroded and immobile cervix points to an advanced stage. Cervical motion tenderness as described in Chapter 1 can be found in tubo-ovarian abscess or tubal pregnancy. Big uterine fibroids that are close to the cervix or in the uterine cavity can shorten the cervix through tension. If they are located to either side of the uterus they can push the cervix to the other side.

Uterus Assess the uterus for size, consistency, tenderness and mobility. You may find an enlarged uterus in pregnancy, uterine cancer, uterine fibroids, adenomyosis and hemato-/pyometra. A uterus with multiple fibroids can become very large, as in advanced pregnancy. Increase in size in all other conditions mentioned is moderate. Note that uterine sarcoma often grow rapidly. In the rare case of abdominal pregnancy you may find a small, soft uterus on bimanual palpation as the gestational products are inserted outside in the abdominal cavity.

Uterine fibroids are typically firm and well defined. They can be palpated as bumps and heaps on the uterine surface if they grow in the uterine wall (see Chapter 19 for different locations of fibroids). All other conditions including a pregnant uterus go along with a softened uterus.

Uterine tenderness can point to malignancy but also to degeneration of a fibroid or infection or a hemato-/pyometra.

Assess uterine mobility as described in Chapter 1. Uterine fibroids can render a uterus immobile through its expanded size in the pelvis. In uterine malignancy the uterus becomes immobile due to infiltration of other structures, such as the broad ligament or the rectum or bladder in advanced stages.

Adnexa Remember that normally sized adnexa are usually not palpable unless the patient is very slender. So all palpable masses on either side of the uterus or above should be considered as a possible tubo-ovarian mass. Differential diagnoses are shown in Figures 1–3. Another differential could be a pedunculated subserous fibroid (see Chapter 19).
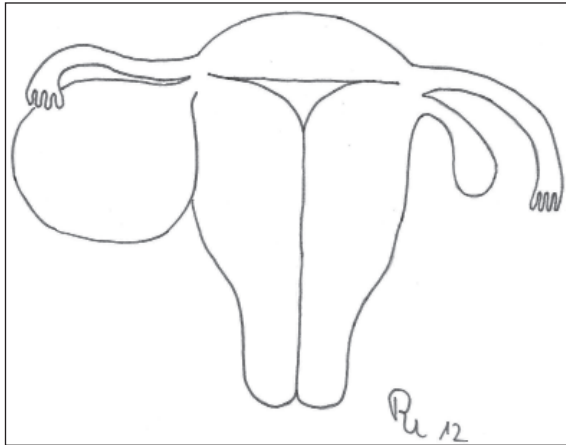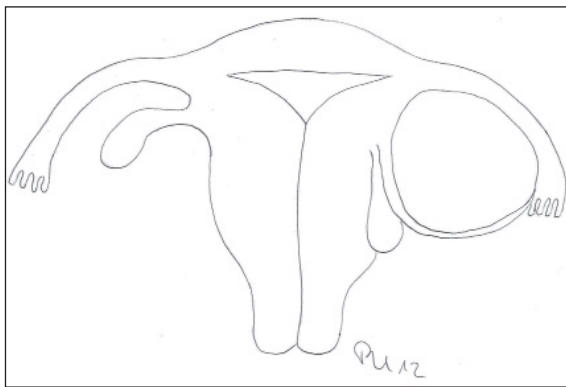
Figure 1 Ovarian mass

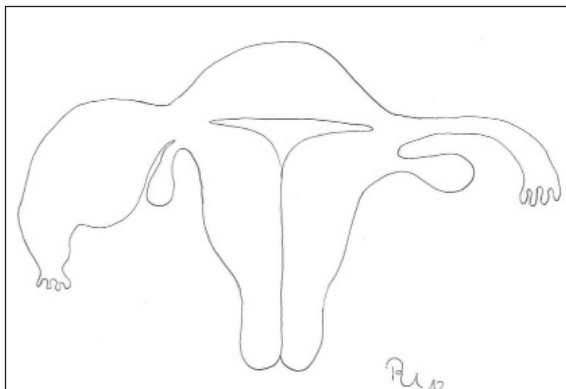**Figure 2** Broad ligament mass (adnexal)

Figure 3 Tubal mass

Another important thing to know is the fact that, with increasing size, genital tumors tend to grow out of the true pelvis as space in the bony pelvis decreases. You might find a mass in the mid-abdomen that originates from the genital organs. Your bimanual palpation might be normal unless

you start assessing the pelvic mass in regard to the pelvic organs.

Pelvic mass Assess the mass for size, surface, tenderness and mobility. The clue here is to move the mass with your outer hand and feel the movement of the uterus or cervix with your inner hand to find out where this mass may possibly arise from. If the uterus moves with the mass, it most likely arises from the uterus. If you cannot palpate any movement, the mass could be either pedunculated and still originate from the uterus or arise from the adnexa or from an extragenital organ.

Recto-vaginal examination

The recto-vaginal examination is described in Chapter 1. It is useful in cases of a fixed pelvic mass where clear borders cannot be differentiated anymore by vaginal palpation or to assess infiltration of para-uterine tissue in advanced cervical cancer.

As you can see it is sometimes not easy to distinguish a pelvic mass by bimanual palpation and it takes a lot of experience to become expert in this. In most cases further diagnostics are needed, especially ultrasound.

BASIC INVESTIGATIONS

After history taking and gynecological examination you might already have a working hypothesis concerning the diagnosis. The two most helpful basic diagnostic tests are UPT and ultrasound (Table 4). As already mentioned you should consider every woman of reproductive age with a pelvic mass as pregnant in order not to miss an ectopic pregnancy. So, in case of doubt, do a UPT. If your hospital has an ultrasound machine and a skilled sonographer your diagnostic work-up for pelvic mass will be easier.

See Chapter 1 on ultrasound assessment in gynecology. In abdominal masses it is important to do

Table 4 Basic investigations that may be helpful in management

Full blood count, erythrocyte sedimentation rate (ESR), urea and electrolytes (U&E), blood grouping and cross-match
Pregnancy test
Ultrasound scans of the abdomen and pelvis

both an abdominal and vaginal ultrasound, as with increased size a genital mass can be lifted out of the pelvis and can then only be detected by abdominal ultrasound. As with bimanual palpation, the aim of an ultrasound scan is to determine the anatomical origin of the mass, size, criteria for malignancy, relationship to other structures and other pathology. Below we will discuss sonographic appearance of the most common gynecological causes of pelvic masses. Please refer to Chapters 2 (blood loss in the first trimester), 12 (ectopic pregnancy) and 15 (molar pregnancy) for appearance of pregnancy-related pelvic masses.

Ultrasound in abdominal masses

Uterine fibroids See Chapter 19. Fibroids are usually darker in appearance on ultrasound than the surrounding myometrium with a fine texture and well-defined borders (Figure 4).

Hematometra/pyometra The uterus is not enlarged but the uterine cavity is dilated. In hematometra the uterine cavity appears as hypoechogenic, in pyometra it appears as hyperechogenic.

Benign tubo-ovarian mass (TOM) TOM can be difficult to assess. An overview of benign tumours is given in Table 5[4]. There are two questions to answer. First, is this malignancy? And second, if not, can I manage this conservatively or does this patient need surgery? Functional cysts usually have thin walls without internal structures and are unilocular (only one cyst). If a cyst has septations or internal growths it is rarely functional and may need removal. If you find ascites, the tumor is almost always malignant, especially with a concomitant upper abdominal tumor (infiltrated
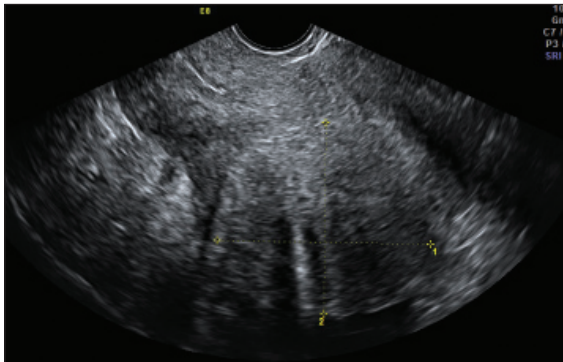

Figure 4 Uterine fibroids at ultrasound

omentum). Note however that pelvic abscesses can show many features of malignant tumors on ultrasound such as, free fluid, multilocularity with septation or internal growth and would then need further imaging. See Chapter 5 for more on the ultrasound features of ovarian torsion and Chapter 6 on endometriosis.

Ultrasound and laboratory tests to differentiate between benign and malignant ovarian tumours

Several tests are available that help to differentiate before surgery between benign and malignant ovarian tumors. They are all based on risk calculations and none of the tests is 100% sensitive or specific. We will describe the Risk of Malignancy Index (RMI) and the International Ovarian Tumor Assessment Group (IOTA) guidelines in this chapter.

Risk of Malignancy Index[5]

$RMI = U \times M \times Ca\text{-}125$

where U = ultrasound score (0, 1 or 3), M = menopausal status (0 = premenopausal, 3 = postmenopausal) and Ca-125 = Ca-125 level (U/l).

Ultrasound scoring system (U):
1 point for each of the following features on ultrasound:
- Multilocular cystadenoma
- Evidence of solid areas
- Evidence of metastasis
- Ascites
- Bilateral lesions

Final U score:
- 0 for none of the features above
- 1 if one feature from above is present
- 3 if two or more features from above are present

A RMI >200 is considered as elevated and suspicious for malignancy. Several studies have shown improved survival when specialists at these centers treat ovarian cancer patients. If possible refer your patient to a gynecological oncologist for further management (see also Chapter 28). Sensitivity and specificity for ovarian cancer versus benign pelvic mass for RMI ≥200 was 92% and 82%, respectively. Corresponding positive and negative predictive values were 62% and 97% (in a Danish study in 1159 patients in a tertiary hospital)[6].

Table 5 Common benign tumors: differential diagnosis of ovarian masses[4]

Histology	Features
Non-neoplastic	
Follicular cysts	Normally < 3 cm in ultrasound
Corpus luteal cysts	Normally <5 cm in ultrasound. Hemorrhage into cyst or rupture may cause abdominal pain or acute abdomen
Ovarian endometrioma	Echogenic cyst on ultrasound, when opening cyst: chocolate-like fluid (see Chapter 6)
Theca lutein cysts	Multiple ovarian cysts triggered by hCG, e.g. molar pregnancy
Ovarian edema	Due to ovarian torsion, enlarged ovary with separated outer layer (see Chapter 5)
Tubo-ovarian abscess	
Benign tumors	
Serous cystadenoma	In 20–30% bilateral, may have septations
Mucinous cystadenoma	Usually unilateral, can get very large. Avoid spillage during surgery by any means
Dermoid cysts (mature teratoma)	10% bilateral, almost always in reproductive age. Avoid spillage during surgery: can contain sebaceous material, hair, cartilage, bone or even teeth (visible on abdominal X-ray)
Fibroma	Can become very large, 40% present with Meiggs syndrome (ascites and pleural effusions) mimicking a malignant tumor
Borderline tumor	
Borderline serous or borderline mucinous	May be unilateral or bilateral multicystic ovarian tumor with papillary formations

hCG, human chorionic gonadotropin.

The RMI performs less well in premenopausal women as they can have several other benign diseases that go along with raised Ca-125 levels, e.g. endometriosis. The published studies on RMI were all done in high-resourced settings with a low prevalence of tubo-ovarian masses. In addition Ca-125 examination is not available in many low-resource settings.

The International Ovarian Tumor Assessment Group guidelines

The IOTA group has developed 'guidelines' for these situations (Table 6) and has validated them in 1983 women in eight countries with good specificity (95%) and sensitivity (91%) (level of evidence II)[7].

If one or more M-rules apply in the absence of a B-rule, the mass is classified as malignant. If one or more B-rules apply in the absence of an M-rule, the mass is classified as benign. If both M-rules and B-rules apply, the mass cannot be classified. If no rule applies, the mass cannot be classified[7]. So women presenting with an ovarian mass with any M-rules on ultrasound need further investigation for suspicion of malignancy (Figures 5–7). For information on malignant ovarian tumors, see Chapter 28.

FURTHER INVESTIGATIONS

Most further investigations help the preoperative assessment concerning the extent of the operation and the need for referral to a specialist unit (Table 7). Surgery of many pelvic masses, such as in cases of malignancy or extensive frozen pelvis can be very difficult and should only be attempted by experienced surgeons in a setting where postoperative monitoring is adequate.

The value of a computed tomography (CT) scan or magnetic resonance imaging (MRI) in a symptomatic patient with an abdominal mass is questionable as the treatment is governed by the skills and resources available in the hospital. Table 8 gives the key points for diagnosis and treatment in abdominal swelling and masses. The most common gynecological conditions are summarized in Table 9.

Table 6   IOTA ultrasound rules[7]

| B-rules	M-rules
Unilocular cysts	Irregular solid tumor
Presence of solid components where the largest solid component <7 mm	Ascites
Presence of acoustic shadowing	At least four papillary structures
Smooth multilocular tumor with a largest diameter <100 mm	Irregular multilocular solid tumor with largest diameter ≥100 mm
No blood flow in duplex Doppler	Very strong blood flow in duplex Doppler
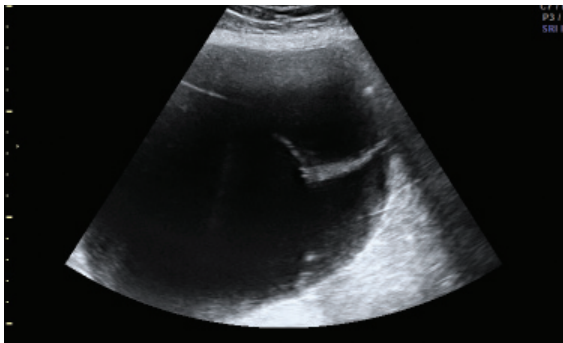
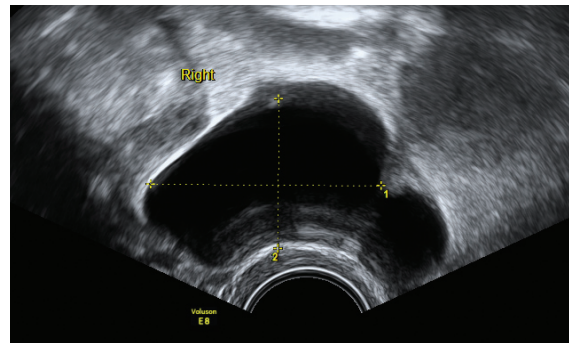**Figure 5**   Ovarian cyst at ultrasound. Courtesy of Mirjam Weemhoff

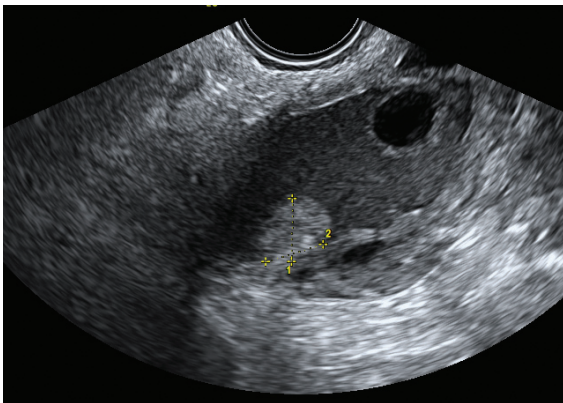**Figure 7**   Hydrosalpinx at ultrasound. Courtesy of Esther Westen

Figure 6   Papillary growth in an ovarian cyst. Courtesy of Mirjam Weemhoff

MINIMAL CARE/TREATMENT

Management strategies for each gynecological problem are based on patient factors and the nature of disease presentation. Some of these conditions need immediate attention and surgical, medical or multimodal treatment, e.g. incidental finding of a uterine fibroid in an otherwise healthy person does not need urgent attention but a similar patient with a complex ovarian mass would need further investigation and attention.

All emergencies must be managed simultaneously with the initial assessment by appropriately trained staff.

We will now describe the management of the following conditions, others can be found in the respective chapters as indicated in Tables 1 and 3:

- Hematometra
- Pyometra
- Borderline ovarian tumors
- Benign ovarian tumors and cysts.

Hematometra/pyometra

This term describes a uterine cavity filled with either blood or pus and is related to a stenosis of the uterine cervix. In young girls who never menstruated before, hematometra is caused by congenital anomalies of the uterus, vagina or hymen as described in Chapters 8 and 24. In women of reproductive age or who are postmenopausal, hemato-/pyometra can be caused by atrophic stenosis or by a carcinoma of the uterus, vagina or cervix. Treatment not only consists

Table 7 Further investigations

Chest X-ray, abdominal X-ray (dermoid cyst), intravenous pyelograph (to look for hydronephrosis) or ultrasound of kidneys (establish the level of obstruction in case of a hydro-ureter)

ECG as appropriate

Culdocentesis and culdotomy (see Chapters 12 and 18) in case of free fluid in Douglas' pouch

Cystoscopy and rectoscopy if available

CT scan or MRI as appropriate and if available in the hospital

Explorative laparotomy

Table 8 Key points in diagnosis and treatment of a swollen abdomen/abdominal mass

Look for signs of shock: pallor, low blood pressure and low volume rapid pulse

Lower abdominal/pelvic tenderness, rigidity, rebound or guarding and any mass arising from the pelvis

Inspect the vulva for any bleeding

Vaginal examination as appropriate +/- swabs

Per rectal examination as appropriate

Always a pregnancy test in any woman of reproductive age

Ultrasound scan if facilities available. Consider a diagnostic peritoneal lavage in case of free fluid either by culdocentesis or abdominal tapping depending on the amount of fluid

of dilatation of the cervical stenosis but always in endometrial sampling (see Chapters 20 and 29) and cervical examination to exclude malignancy. In cases of pyometra, the pus is most commonly sterile, so there is no need for culture or staining except if you suspect tuberculosis. It is more important to produce a specimen for histology.

Treatment of hematometra/pyometra is a careful D&C under anesthesia and if possible under ultrasound guidance.

Borderline ovarian tumors

These are ovarian tumors with low malignant potential that occur mainly in premenopausal women. They tend to be confined to the ovary, but implants in the abdomen are described. They have different histological features:

- Mucinous borderline ovarian tumors are usually restricted to one ovary.
- Serous borderline ovarian tumors are in 25–50% bilateral, and 25–30% of the patients may have some extra-ovarian disease so staging is appropriate[8]. Frozen section diagnosis of a low malignant potential tumor of the ovary is changed to a final diagnosis of invasive cancer in approximately 10% of cases. Serous borderline tumors may have (invasive or non-invasive) implants.

Most patients present with an asymptomatic pelvic/abdominal mass. On ultrasound the tumor is mostly multilocular with papillary formations but without ascites, but a non-suspicious cyst does not exclude borderline disease. Ca-125 may be (slightly) elevated.

Therapy Surgical staging without pelvic and para-aortal lymph node dissection as this does not influence the prognosis[9]: obtain free fluid or wash the abdomen for cytology, systematically examine the whole abdomen (see Chapter 28) and take a biopsy of any suspicious lesion, take biopsies of the peritoneal surface of Douglas' pouch, the bladder peritoneum, the paracolic gutters and the right diaphragm. Remove the omentum, the uterus, both tubes and ovaries (see Chapter 19 for method). In patients who wish to spare their fertility a unilateral oophorectomy can be performed and the uterus and the healthy adnexa will not be removed.

The prognosis of borderline ovarian tumors is good: patients without implants have a disease-free survival of 99%. The most reliable prognostic indicator for advanced stage tumors is the type of peritoneal implant. Survival of patients with non-invasive peritoneal implants is 95%, compared with 66% for invasive implants, and lymph node involvement was associated with a 98% survival[9].

There is no place for adjuvant chemotherapy in borderline ovarian tumors.

Benign ovarian cysts and tumors

Persistent or big ovarian cysts

Persistent or big ovarian cysts with sonographically suspicious features (see above) should be assessed by surgery (laparotomy or if available laparoscopy

Table 9 Common gynecological conditions associated with abdominal masses

Gynecological condition	Common symptoms associated with pelvic mass
Uterine fibroids	Reproductive age, abnormal uterine bleeding, secondary dysmenorrhea, frequent voiding, constipation, chronic pelvic or back pain, recurrent miscarriage, infertility
Advanced uterine cancer or sarcoma	Postmenopausal bleeding, pressure symptoms, pelvic pain, rapid growth of uterine mass in sarcoma
Endometriosis	Reproductive age, chronic pelvic pain, secondary dysmenorrhea, dyspareunia, infertility
Tubo-ovarian abscess, pyosalpinx, hydrosalpinx	Reproductive age, chronic pelvic pain with aggravation, dyspareunia, often intermenstrual bleeding, spotting, abnormal vaginal discharge, infertility. A hydrosalpinx is most often symptomless
Benign ovarian cysts or tumors	Reproductive age, often symptomless, acute or chronic pelvic pain, pressure symptoms, sometimes irregular cycles, spotting
Ovarian cancer	Peak age postmenopausal, increased abdominal circumference, sometimes dyspnea, postmenopausal bleeding, pressure symptoms, obstipation or ileus

by a skilled surgeon). Note however, that you should not attempt doing a mini-laparotomy or unskilled laparoscopy on an ovarian tumor with suspicious sonographic features. If it ruptures intra-abdominally you have made your patient's prognosis and chance of cure a lot worse (see Chapter 28).

Tubo-ovarian masses associated with pelvic inflammatory disease

Tubo-ovarian masses associated with pelvic inflammatory disease (PID) are difficult to assess. If the mass turns out to be related to the tube, e.g. a hydro- or pyosalpinx, perform a salpingectomy as described in Chapter 12. Reconstructive tubal surgery to restore tubal patency exists but should be carried out by experienced surgeons. If you try to just re-open the hydrosalpinx there is a significant increase in the risk of ectopic pregnancy in that tube. In cases of pelvic abscess do a culdocentesis (see Chapter 12) first and if pus is drained do a culdotomy as described in Chapter 18. If the tubo-ovarian abscess doesn't reach the pouch of Douglas you will have to do a laparotomy. This type of surgery is for experienced surgeons only as the normal anatomy may be distorted, the peritoneum is thickened with chronic infection and the risk of ureteric damage is high. Identify the uterus, adnexa, sigmoid and bladder. If all organs are included in the

mass you should not attempt this surgery unless you are very experienced and able to repair a bowel or bladder lesion. If you are able to identify and mobilize (do this bluntly with your fingers!) the adnexa involved, perform an adnexectomy as described below under the treatment for postmenopausal women. Take great care to visualize the ureter.

Simple ovarian cysts

These are very common in women of reproductive age (follicular and corpus luteum cysts). Benign cyst are unilocular and transechogenic, and have no septa or papillary formations. As they are physiological, watchful waiting for two to six cycles is appropriate in an asymptomatic simple cyst of <5 cm diameter in a premenopausal woman. Re-scan after 3 and 6 months. If still persistent after 6 months, surgery may be appropriate. It is still common practice in many settings to treat simple ovarian cysts with oral contraceptives but a Cochrane review on this subject showed no benefit of this treatment over watchful waiting[10] (level of evidence 1).

Due to the difference in histology and risk of malignancy it is wise to differentiate between adolescent, pre- and postmenopausal patients for their management. For the treatment of adolescent patients see Chapter 24.

Premenopausal women As described above uncomplicated cysts with a low RMI can be managed conservatively. The risk of malignancy is low in this age group (1 : 1000)[11]. It is always important in this age group to consider fertility preservation in your treatment. If <5 cm, re-scan after 3 and 6 months; 50% of these cysts can still resolve. It is important to discuss the implications of regular visits to the health facility with your patient.

If after several cycles the cyst still persists or is symptomatic at any visit you may remove it. Aspiration of the content of a cyst abdominally or vaginally has no benefit because of the high risk of recurrence and should not be performed. Adnexal removal will be by laparotomy in most settings; if laparoscopy is available and you are experienced in this type of surgery, a non-suspicious simple cyst or mass, e.g. a dermoid, can be removed via laparoscopy. If the cyst is unilocular and shows no signs of malignancy in ultrasound you might consider a mini-laparotomy. Due to the special needs in this age group any surgery should aim at organ preservation through the excision of the cyst or tumor leaving healthy ovarian tissue behind. A very good description on how to perform an *ovarian cystectomy* can be found at: http://www.atlasofpelvicsurgery. com/6FallopianTubesandOvaries/21OvarianCyste ctomy/chap6sec21.html.

Postmenopausal women Every postmenopausal woman with an ovarian cyst or mass should be suspected for ovarian malignancy due to the higher incidence of ovarian cancer in this age group. Use the RMI described above as a basis for your treatment strategy. If Ca-125 is not available, as in most primary or secondary health facilities in low-resource settings use the IOTA rules. If in doubt, refer for specialist care to a higher level, or if you are an experienced surgeon remove the ovarian mass as described in Chapter 28. A woman with a simple cyst of <5 cm and a low RMI (<25) or B-rules can be treated conservatively provided she agrees to regular check up every 2 or 3 months. If she doesn't, it is better to remove the mass and arrange for histology. In postmenopausal women this is best done through bilateral adnexectomy. Here is a description on how to do a simple *bilateral adnexectomy* for benign ovarian disease:

- Open the abdomen using a vertical midline incision or a Pfannenstiel incision depending on size and sonographic features of the mass.

If you have any doubt, perform a vertical incision.

- Identify the adnexa with the mass and assess for potential malignancy. If there is free fluid in the pouch of Douglas and you have the possibility of cytology, take a specimen with a small syringe. Assess the mass if there is any rupture, outside growth or infiltration of other structures. If there are none of these features the mass is possibly benign. But as there is still a chance of malignancy take utmost care to remove the adnexa with the mass intact.

- *Identification of the ureter*: grasp the peritoneum around the round ligament with a blunt forceps and incise it and widen this opening carefully towards the pelvic wall parallel to the infundibulopelvic ligament. Put your index finger in the space and your thumb behind it: digitally explore the ureter which is usually in the medial part of the space you created and runs from the pelvic brim to the bladder underneath the adnexa.

- *Identification of the infundibulopelvic ligament*: once you've identified the ureter, follow it backwards away from the uterus and you will find the infundibulopelvic ligament containing the ovarian vessels.

- *Dissection of the infundibulopelvic ligament*: undermine it using your finger and put two strong forceps, avoiding the ureter. Dissect the ligament in between the forceps and double tie the part in the posterior forceps.

- *Dissection of the suspensory ligament of the ovary, the tube and the ovarian branch of the uterine artery*: put a straight forceps on the tube and suspensory ligament and make a hole in the mesosalpinx underneath where you do not see any blood vessels running. Place a second forceps so that the tip is reaching the hole in the mesosalpinx and re-set the first forceps alike. Transect the tube and the suspensory ligament and ligate with a Heaney stitch (see Chapter 19 on how to do a Heaney stitch). Most of the time the ovarian branch of the uterine artery will be included in this suture.

- *Dissection of the mesosalpinx*: place two curved forceps from each side on the remaining mesosalpinx, ligate and cut. If the tube and the adjacent mesosalpinx are larger you might need more than two forceps as otherwise the tissue will slip from your forceps. Remove the adnexa with the mass carefully from the abdominal

cavity without spillage of its content. Assess for bleeding and carry out hemostasis where necessary. Close the abdomen in layers.

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Further reading

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