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Guideline No. 404: Initial Investigation and Management of Benign Ovarian Masses



(En français : Évaluation initiale et prise en charge des masses ovariennes bénignes)

The English document is the original version. In the event of any discrepancy between the English and French content, the English version prevails.

This Clinical Practice Guideline was prepared by the authors and overseen by the SOGC's Gynaecology Clinical Practice Committee. It was reviewed by the SOGC's Family Physician Advisory Committee, Canadian Paediatric and Adolescent Gynaecology and Obstetrics Committee, and Guideline Management and Oversight Committee and by the Society of Gynecologic Oncology of Canada's Guidelines Committee. This Guideline was approved by the SOGC Board of Directors.

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RECOMMENDED CHANGES IN PRACTICE

1. Asymptomatic ovarian masses <10 cm in diameter characterized as benign on ultrasound can be managed conservatively.
2. In premenopausal women, symptomatic ovarian masses characterized as benign on ultrasound should be managed surgically with cystectomy. In postmenopausal and perimenopausal women, bilateral salpingo-oophorectomy is recommended. Treatment decisions should, however, be flexible and take the patient's wishes into account.

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Informed Consent: Everyone has the right and responsibility to make informed decisions about their care together with their health care providers. In order to facilitate this, the SOGC recommends that they provide their patients with information and support that is evidence-based, culturally appropriate, and personalized.

Language and Inclusivity: This document uses gendered language in order to facilitate plain language writing but is meant to be inclusive of all individuals, including those who do not identify as a woman/female. The SOGC recognizes and respects the rights of all people for whom the information in this document may apply, including but not limited to transgender, non-binary, and intersex people. The SOGC encourages health care providers to engage in respectful conversation with their patients about their gender identity and preferred gender pronouns and to apply these guidelines in a way that is sensitive to each person's needs.

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- Closely follow patients with an indeterminate mass and obtain further characterization by serial ultrasound, from an expert sonographer, or by magnetic resonance imaging, and, when applicable, with tumour marker tests (see companion guideline no. 403 on the initial investigation and management of adnexal masses).
- Patients with a mass characterized as malignant on ultrasound should be referred to a gynaecologic oncologist.

KEY MESSAGES

- Asymptomatic ovarian masses <10 cm in diameter characterized as benign do not require removal.
- Ovarian torsion is rarely associated with cystic masses <5 cm in diameter. In addition, ovarian malignancy is rarely associated with ovarian torsion, although, in postmenopausal women with torsion, there is a higher incidence of malignancy, with the approach to management based on the overall clinical picture and patient wishes.
- Preservation of ovarian tissue, if technically possible, is important in premenopausal women.
- For symptomatic masses characterized as benign, laparoscopy is recommended, if technically possible.
- If malignancy is suspected, patient care should be managed by a gynaecologic oncologist.

GLOSSARY

Term	Definition used in this guideline ^a
Menopause	The final menstrual period, which is confirmed after 12 consecutive months without a period, marking the permanent end of menstruation and fertility.
Perimenopause	The period beginning immediately prior to menopause when changes in the menstrual cycle and other menopause-related symptoms begin, through menopause, and for 1 year after menopause.
Postmenopause	The period of time following menopause (the final menstrual period).
Premenopause	The period of time from puberty (onset of menstrual periods) to menopause.

^a Adapted from definitions provided in the Canadian Consensus on Menopause and Osteoporosis, Journal of Obstetrics and Gynaecology Canada, 23(9), p. 835, and the North American Menopause Society’s Menopause Glossary, available at www.menopause.org/for-women/menopause-glossary.

ABSTRACT

Objective: To provide recommendations for a systematic approach to the initial investigation and management of a benign ovarian mass and facilitate patient referral to a gynaecologic oncologist for management.

Intended Users: Obstetricians, gynaecologists, family physicians, internists, nurse practitioners, radiologists, general surgeons, medical students, medical residents, fellows, and other health care providers.

Target Population: Women ≥18 years of age presenting for evaluation of an ovarian mass (including simple and unilocular cystic masses,

endometriomas, dermoids, fibromas, and hemorrhagic cysts) who are not acutely symptomatic and without known genetic predisposition to ovarian cancer.

Outcomes: This guideline aims to encourage conservative management and help reduce unnecessary surgery and long-term health complications, maintain fertility, and decrease operative costs and improve overall patient care and outcomes by providing criteria for referral of patients with ultrasound imaging findings suggestive of a malignant mass to a gynaecologic oncologist.

Evidence: Databases searched: Medline, Cochrane, and PubMed. Medical terms used: *benign asymptomatic and symptomatic ovarian cysts, adnexal masses, oophorectomy, ultrasound diagnosis of cysts, simple ultrasound rules, surgical and medical therapies for cysts, screening for ovarian cancer, ovarian torsion, and menopause*. Initial search was completed by 2017 and updated in 2018. Exclusion criteria were malignant ovarian cystic masses, endometriosis therapies, and other adnexal pathologies unrelated to the ovary.

Validation Methods: The content and recommendations were drafted and agreed upon by the authors. The Society of Obstetricians and Gynaecologists of Canada’s Board of Directors approved the final draft for publication. The quality of evidence was rated using the criteria described in the Grading of Recommendations Assessment, Development and Evaluation methodology framework.

Benefits, Harms, Costs: Implementation of the recommendations could reduce costs due to unnecessary surgeries and hospitalizations and reduce lost work days and the risk of loss of fertility, early menopause, and surgical complications.

SUMMARY STATEMENTS (GRADE ratings in parentheses)

- The following ovarian masses typically demonstrate classic benign features on ultrasound: simple or unilocular cystic mass, hemorrhagic cyst, endometrioma, mature cystic teratoma (dermoid), and fibroma (high).
- The risk of malignancy for simple ovarian cystic masses is low (<1%) for <10 cm in diameter (high).
- Patients with an ovarian mass ≥5 cm in diameter are at increased risk for ovarian torsion (moderate).
- Laparoscopy is the recommended approach for surgical management of symptomatic benign ovarian masses because it not only is technically feasible and safe but also provides the advantages of shorter hospital stays, faster recovery times, and less pain and bleeding compared with laparotomy (high).
- Comprehensive preoperative evaluation is necessary in order to determine the risk of malignancy of an ovarian mass before deciding on the appropriate surgical management (high).
- Electrocautery for hemostasis should be used sparingly in order to reduce the risk of damage to healthy ovarian tissue and minimize adhesion formation (high).

RECOMMENDATIONS (GRADE ratings in parentheses)

- In the asymptomatic patient, masses characterized as benign on ultrasound can be followed initially by repeat ultrasound in 8 to 12 weeks, preferably in the proliferative phase of the menstrual cycle for premenopausal women. Follow-up ultrasound can then be done yearly for masses that remain stable and do not develop malignant features (strong, moderate).
- Most asymptomatic masses <10 cm in diameter and characterized as benign can be managed conservatively (strong, high).
- If surgery is performed for a symptomatic mass characterized as benign on ultrasound, unilateral or bilateral oophorectomy can be considered for postmenopausal women (strong, low) and ovarian cystectomy can be considered for premenopausal women if technically

feasible (strong, low). For perimenopausal women, the decision to perform a cystectomy with a possible salpingectomy versus an oophorectomy should be part of a shared decision-making discussion between the patient and her health care provider (strong, low).

4. Laparoscopic ovarian cystectomy is the recommended surgical approach for removal of cystic masses, rather than fenestration and aspiration (strong, moderate).
5. Laparoscopic management should involve examination of the peritoneal surfaces, appendix, upper abdomen, posterior cul-de-sac, and bladder in addition to uterus, tubes, and ovaries for evidence of disease. In addition to pelvic washing for cytology, a biopsy of

peritoneal surfaces should be taken for histopathology only if malignancy is suspected (strong, high).

6. Peritoneal washing for cytology and frozen section for analysis should be undertaken at the time of surgical management of an ovarian mass if there is a suspicion of malignancy. To improve the diagnostic accuracy, specimens should be interpreted by a pathologist with gynaecologic expertise, if resources permit (strong, high).
7. When pathology results reveal malignancy in an ovarian mass that had originally been presumed benign, comprehensive surgical staging should be performed by a surgeon with expertise in gynaecologic oncology, if resources permit (strong, high).

INTRODUCTION

The management of a presumed benign ovarian mass (including simple cystic masses, unilocular cystic masses, endometriomas, dermoids, fibromas, and hemorrhagic cysts) is decided based on the severity of symptoms at the time of presentation or, if the patient is asymptomatic, the likelihood of malignancy. Decisions on surgical and conservative management options should also take into consideration the patient's symptoms, physical examination, age, fertility concerns, and risk factors, and, in the case of asymptomatic masses, ultrasound findings.¹ Advances in ultrasound evaluations and studies on outcomes in large populations enable division of asymptomatic ovarian masses into 3 categories:^{2,3}

1. Benign
2. Likely malignant
3. Indeterminate

Ultrasound findings are discussed further in the section on ultrasound imaging for ovarian masses, while the choice of additional investigations is determined by the category of the ovarian mass. For standardized descriptions and terminology related to adnexal masses, consult the Ovarian–Adnexal Imaging Reporting Data System, O-RADS, available at www.acr.org/Clinical-Resources/Reporting-and-Data-Systems/O-Rads.

The diagnosis of an ovarian mass can lead to increased fear and anxiety for the woman.⁴ Up until recently, benign ovarian masses were removed during hysterectomies performed for other surgical indications. In addition, women were traditionally advised to have benign ovarian masses removed to diagnose or as a method to prevent ovarian cancer. While the incidence of ovarian malignancy is higher in postmenopausal women, all ovarian masses with benign features do not require removal. It is important to recall that surgical removal not only has a cost associated with it and the potential for complications (estimated to occur in 2% to 15% of women)^{5,6} but also the risk of effecting fertility and increased anxiety and time away from work for the patient.

This guideline provides recommendations that will lead to improved management of ovarian masses characterized as benign on ultrasound, reduce unnecessary surgeries and investigations, and improve the triage of suspected malignant masses to facilitate patient referral to a gynaecologic oncologist for management. Improved management will not only help reduce patient anxiety associated with expectant management and conservative treatment but also help preserve the patient's ovarian function and fertility (if premenopausal) and contribute to achieving the best outcomes possible for patients with malignant masses.

Guidance on the initial work-up (including imaging) and referral of women with ovarian masses is provided in the SOGC's companion guideline no. 403 on the initial investigation and management of adnexal masses.

The quality of evidence was rated using the criteria described in the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology framework (see online appendix [tables A1](#) and [A2](#)).

SUMMARY STATEMENTS 1, 2 and RECOMMENDATIONS 1, 2

MANAGEMENT OF THE ASYMPTOMATIC PATIENT WITH OVARIAN MASS

Ovarian masses considered “likely benign” can be evaluated by ultrasound either through subjective pattern recognition by an expert sonographer or using simple risk assessment tools.^{3,7} Masses that demonstrate classic benign features that will be discussed in this guideline include simple or unilocular cystic masses, hemorrhagic cyst, endometrioma, mature cystic teratoma, and fibroma.^{3,7}

Ultrasound imaging for ovarian masses

A comprehensive assessment of ovarian morphology is required to determine the risk of malignancy, with transvaginal ultrasound favoured for the initial investigation of ovarian masses. Pattern recognition by an expert sonographer is one approach to classifying ovarian masses as “benign,” “likely malignant,” or “indeterminate.” An alternative approach to categorizing findings suggestive of benign or malignant masses is using an established risk prediction model (e.g., International Ovarian Tumor Analysis group's simple rules or ADNEX).^{8,9}

The majority of masses that are characterized as benign on ultrasound will resolve or remain unchanged over time, particularly in the asymptomatic patient.^{10,11} Monitoring with serial ultrasound over the short term (preferably conducted in the proliferative phase for premenopausal women) can identify any rapidly changing masses and avoid unnecessary surgical treatment for stable masses.¹² If a mass is determined to be low risk for malignancy on ultrasound, a repeat scan is recommended 8 to 12 weeks after the initial assessment. For masses that demonstrate classic benign features on ultrasound, the frequency of imaging can be reduced to yearly for 5 years.^{3,13} However, the optimal interval for serial sonographic monitoring of benign-appearing masses has not been established.³

Masses are classified as indeterminate on initial ultrasound can be managed in several ways. Follow-up ultrasound 8 to 12 weeks after the initial scan, preferably performed in the proliferative phase of the cycle, provides the opportunity to observe any spontaneous regression or decrease in size in the majority of benign-appearing masses, thus improving the accuracy of predicting for malignancy for a given mass. Referral to a specialized ultrasound consultant such as a radiologist or a sonographer trained in pattern recognition, where resources permit, improves diagnostic performance, with sensitivity up to 96.7%.⁷ Risk prediction algorithms, in particular the IOTA simple rules and ADNEX models, have been shown to aid in assessing the risk of malignancy of a given mass.^{8,14} Magnetic resonance imaging as a tool for diagnosing malignancy is highly sensitive (96.6%) and specific (83.7% to 94.0%).¹⁵ In addition, it can help confirm a benign diagnosis, particularly in atypical common masses such as dermoids, endometriomas, and fibromas. The risk of malignancy of a solid adnexal mass consistent with a fibroma is considered higher than for other adnexal masses with benign sonographic features, in the 2% range.¹⁶ The decision regarding follow-up after an indeterminate ultrasound will depend on both the experience of the physician and availability of local resources.³ SOGC's companion guideline no. 403 on the initial investigation and management of adnexal masses, additional information on features of indeterminate masses, including partly solid and small wall abnormalities.

Simple and Unilocular Ovarian Cystic Masses

A simple ovarian cystic mass is anechoic and characterized by a round or oval shape, thin walls, and no solid components, septations, or internal flow on colour Doppler ultrasound. A unilocular cystic mass may contain features such as partial septations, internal echoes, or solid wall irregularities <3 mm in height.^{3,7,17}

Regardless of the woman's menopausal status, simple ovarian cystic masses are almost always benign except in rare circumstances (<1% risk of malignancy).^{18–22}

Recommended follow-up for asymptomatic simple ovarian cystic masses

Large prospective series have followed women with unilocular ovarian cystic masses over time with serial ultrasound. Most simple cystic masses, even those ≥ 10 cm in diameter, will resolve without treatment.^{18,23} Surgery is generally not indicated for patients with asymptomatic simple or unilocular cystic masses, at least not initially. Follow-up ultrasound can be performed annually for up to 5 years to detect concerning morphologic changes.

Do simple cystic masses become malignant?

Several large studies, including the University of Kentucky Ovarian Cancer Screening Program,²⁴ the U.K. Collaborative Trial of Ovarian Cancer Screening,⁶ and the Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial,^{5,25} have provided information about the benign natural history of simple ovarian cystic masses.¹⁸ Simple cystic masses are common regardless of the woman's menopausal status; however, the majority of masses resolve spontaneously.^{5,6,18,24,25} The risk of malignancy remains low (<1%) regardless of menopausal status.^{5,6,18,19,21,22,24,25}

Managing hemorrhagic cysts, endometriomas, and mature cystic teratomas in asymptomatic patients

Hemorrhagic ovarian cysts are associated with corpus luteum or other functional cysts. On ultrasound, these masses may have a similar appearance to endometriomas, but most hemorrhagic cysts ≤ 5 cm in diameter are self-limiting and, in premenopausal women, will resolve over a short period of time.⁷ Hemorrhagic cysts should not occur in postmenopausal women and, if they do occur, warrant closer investigation.

Repeat imaging can be performed 8 to 12 weeks following the initial scan to assess for resolution. Endometrioma should be considered in the differential diagnosis of a persistent mass in this context.

Endometriomas have a typical appearance on ultrasound; treatment is complex and based on the patient's symptoms and her desire to maintain fertility. A full discussion of management is, therefore, beyond the scope of this guideline. The risk of malignant transformation over time remains less than 1% for classic-appearing endometriomas and mature cystic teratoma; however, when they are ≥ 10 cm in diameter or have a solid vascular component, there is a slightly increased risk of malignancy (1% to 10%) and surgery should be considered.^{7,26–28}

For all asymptomatic masses with benign characteristics, ultrasound can be repeated 8 to 12 weeks after the initial scan, followed by yearly ultrasound monitoring for 5 years (Figure).

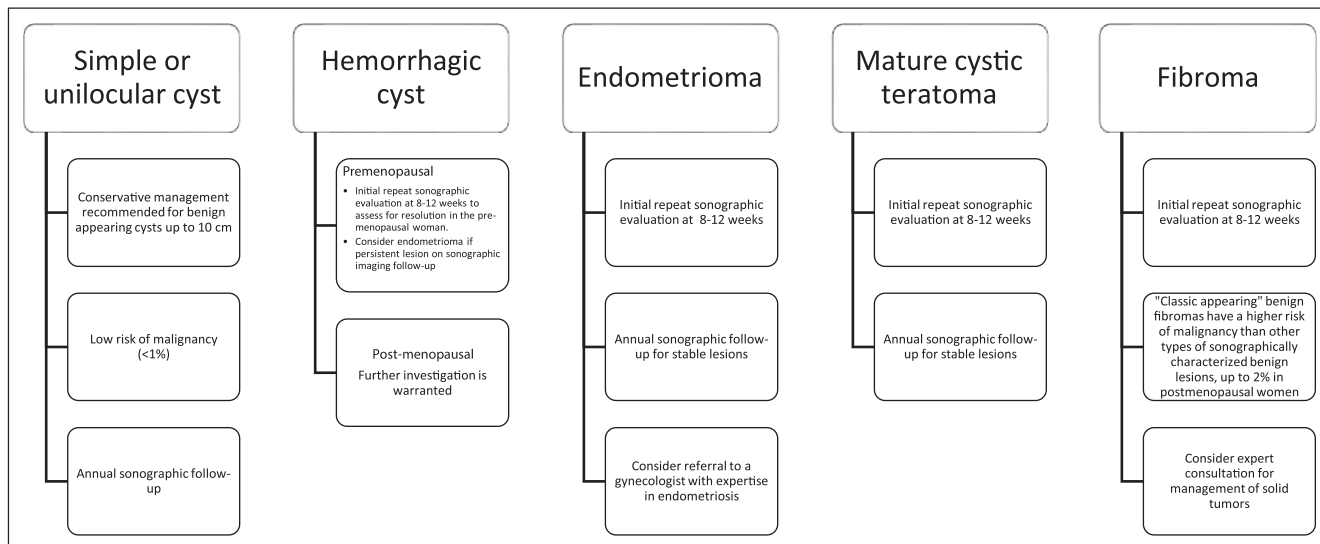
SUMMARY STATEMENT 3

Considerations for Monitoring

The risk of ovarian torsion with asymptomatic ovarian masses

Ovarian torsion rarely occurs in adult patients with normal ovaries.^{29,30} It is difficult to determine the exact risk of

Figure. Recommended follow-up protocol for asymptomatic women with an ovarian mass <10 cm in diameter that demonstrates classic benign features on ultrasound.



torsion in asymptomatic patients with an ovarian mass because torsion is typically diagnosed in symptomatic patients who undergo surgical treatment. However, the size and type of mass seem to be important contributing factors. Three retrospective reviews have found that at least 80% of ovarian torsion occurs when the ovary is enlarged by >5 cm.^{29–31} The most common histologic subtypes were benign hemorrhagic cysts, mature teratomas, and serous cystadenomas.²⁹ Ovarian malignancy is rarely associated with ovarian torsion (<2% of cases), although, in the postmenopausal population, the rate is higher and may be anywhere from 3% to 22%.^{32–35}

Patients with an asymptomatic ovarian mass should be educated about the signs and symptoms of ovarian torsion, as swift diagnosis and surgical intervention can improve the chances of ovarian preservation.³⁵

The psychological effects of receiving a diagnosis of an ovarian mass

The psychological impact associated with the ongoing monitoring of an ovarian mass should not be underestimated. A systematic review and meta-analysis of the risks and benefits of ovarian cancer screening in asymptomatic women reported that false-positive results can increase cancer-associated distress, with no significant impact in overall quality of life.³⁶

Repeat imaging can increase patient anxiety to the point that unnecessary surgical intervention occurs even when masses remain stable in appearance.¹² Surgical complication rates have been reported anywhere from 2% to

15%.^{6,37} Therefore, the potential harm from unnecessary surgery must not be underestimated.

MANAGEMENT OF THE SYMPTOMATIC PATIENT WITH OVARIAN MASS

The goals of surgery for a symptomatic patient with a presumed benign ovarian mass should be to: (i) completely remove the mass, (ii) reduce the risk of recurrence, and (iii) preserve healthy ovarian tissue.

Ovarian Cyst Rupture or Hemorrhage

Ovarian cyst rupture and hemorrhage are physiologic events involving the follicle or corpus luteum that occur during the ovarian cycle. This event can be painful due to peritoneal irritation caused by cyst fluid or from the stretching of the ovarian capsule from hemorrhage into the cyst.³⁸

Surgery should be performed if there is: (i) hemodynamic compromise, (ii) increasing hemoperitoneum or decreasing hemoglobin concentration, (iii) persisting symptoms for 48 hours or more after presentation, or (iv) uncertain diagnosis or suspicion of torsion.³⁸

Ovarian cystectomy vs. oophorectomy

If malignancy is suspected, oophorectomy rather than ovarian cystectomy should be performed, by a gynaecologic oncologist when possible. For ovarian masses in premenopausal women that are characterized as benign, ovarian cystectomy is preferred over oophorectomy in order to preserve fertility and hormonal function. When

possible, premenopausal women with torsion should undergo simple de-torsion of the ovary, with or without cyst removal (which may require a second surgery).³⁵ Postmenopausal women should undergo oophorectomy for a symptomatic cystic mass; bilateral salpingo-oophorectomy, or at least bilateral salpingectomy, could also be considered.³⁵ Health care providers should discuss the benefits of ovarian preservation versus oophorectomy with perimenopausal women, and the decision should be based on the overall clinical picture and patient wishes.

Ovarian cystectomy vs. fenestration and aspiration

Laparoscopic ovarian cystectomy is the preferred surgical method because it can allow for a pathologic diagnosis and is associated with a lower rate of recurrence of cystic masses. Cytologic evaluation of aspirated cyst fluid cannot reliably exclude malignancy.

Fenestration (creating a full-thickness opening) of the ovary is associated with a higher rate or recurrence of cystic masses compared with ovarian cystectomy. Cyst aspiration followed by sclerotherapy is not recommended due to a paucity of evidence to support prevention of recurrence.

Health-related effects of ovarian cystectomy and unilateral and bilateral oophorectomy

Excision of benign masses may affect ovarian reserve.³⁹ Approximately 60% of unilateral oophorectomies occurred at the time of hysterectomy, with the most common pathological finding being benign ovarian cystic masses (58.6%) followed by normal ovarian tissue (38.9%).^{40,41} A database analysis of all hysterectomies performed in California between 2005 and 2011 found that the rate of inappropriate oophorectomy at the time of benign premenopausal hysterectomy was 37.7% and that the rate varied by age, race, and public versus private hospital setting.⁴²

Unilateral oophorectomy can lead to earlier onset of menopause, decreased incidence of ovarian cancer, and subfertility. The Nurses' Health Study and others have shown that unilateral oophorectomy reduced ovarian cancer by $\geq 30\%$.^{43,44} The fertility literature has found that there also may be differences between conservation of the right or left ovary, with ovulation occurring more frequently in the right ovary and with a higher follicle yield.^{45,46}

Bilateral oophorectomy, associated with early menopause (under the age of 45), produces multiple poor long-term health outcomes such as earlier death, cardiovascular disease (including coronary artery disease), dementia, Parkinson disease, and several other chronic health conditions.^{47–50}

It is recommended that, if possible, simple ovarian cystic masses < 10 cm in diameter not be removed. If the patient is asymptomatic, the preferred option should be ovarian conservation when possible.

Medical treatment prior to surgery

Hormonal treatments do not provide an advantage in the medical treatment of functional ovarian cystic masses compared with expectant management. Expectant management achieves resolution rates similar to the use of oral contraceptives.⁵¹

Preoperative hormonal management of endometriomas is beyond the scope of this guideline.

SUMMARY STATEMENTS 4, 5, 6 and RECOMMENDATION 5

Technical Considerations for Surgery

Laparotomy vs. laparoscopy

Laparoscopy is the preferred approach for surgical management of the benign-appearing symptomatic ovarian mass because it is associated with shorter hospital stays, faster recovery times, and less pain and bleeding compared with laparotomy. However, laparoscopy may be associated with spillage of cyst contents and subsequent peritonitis, as well as cell seeding and longer operative times, particularly in the case of large masses. Nonetheless, the literature describes laparoscopic techniques to successfully manage benign masses with diameters ≤ 30 cm.⁵² When operating on a large mass, the surgeon can achieve optimal visualization when the patient is in the Trendelenburg position, which displaces the ovary into the upper abdomen and exposes the infundibulopelvic ligament, to facilitate performing a cystectomy or oophorectomy in a contained specimen bag (see **Specimen Handling**). There is no difference in the rate of recurrence of cystic masses between laparoscopy and laparotomy. It is important to make patients aware, however, that repeat surgery may be required due to recurrence in the ovary.

Risk of cancer in a presumed benign ovarian mass

Preoperative ultrasound evaluated by expert sonographers can confirm benign characteristics of ovarian masses with over 90% accuracy. Laparoscopic management of a presumed benign mass should still involve examination of peritoneal surfaces, appendix, upper abdomen, posterior cul-de-sac, and bladder in addition to uterus, tubes, and ovaries for evidence of disease. In addition to pelvic washing for

cytology, a biopsy of suspicious surfaces for histopathology is recommended if malignancy is suspected intraoperatively.

Hemostasis after ovarian cystectomy

Hemostasis of the ovarian tissue bed after cystectomy is necessary. Bipolar electrodiathermy is associated with damage to ovarian tissue and decreased ovarian reserve.^{53,54} Electrocautery should be used sparingly to reduce risk of damage to healthy ovarian tissue and adhesion formation, particularly in the premenopausal woman desiring fertility preservation.

Alternative forms of energy, such as plasma energy⁵⁵ and carbon dioxide laser, may be associated with less thermal damage. Other techniques to achieve hemostasis include suture, endo loop ligation, and hemostatic agents. Two studies found no fertility advantages for bipolar electrocautery over hemostatic suture of the ovary.^{56,57}

RECOMMENDATION 6, 7

Intraoperative Washing for Cytology and Frozen Section Analysis

Role of frozen section analysis

Frozen section, or rapid histologic, analysis is less accurate for diagnosing borderline malignant masses than for diagnosing benign or malignant masses. There is an approximate 1 in 5 chance that a diagnosis of a borderline mass by frozen section analysis will result in a final diagnosis of cancer and a 94% to 99% chance that a diagnosis of malignancy by frozen section analysis will remain the same.⁵⁸ Frozen section analysis is most accurate when results are interpreted by a pathologist with gynaecologic expertise.

Specimen Handling

Methods to avoid spillage

The risk of spillage during laparoscopy reported in the literature ranges from 12% to 25%.^{59,60} Spillage is associated with tumour cell dissemination, peritoneal inflammation, chemical peritonitis, and the upstaging of malignancy. Tumour cell dissemination is not usually a concern in the case of a mass with benign characteristics on preoperative ultrasound given the high diagnostic accuracy of ultrasound assessment.

Port entry. Compared with usual initial trocar insertion via open or Veress needle insertion, infraumbilical incision, an incision between the umbilicus and the xiphisternum, or left upper quadrant (Palmer's point) entry may minimize

the risk of inadvertent cyst puncture compared with blind-Veress insertion.⁶¹

Controlled laparoscopic-guided cyst aspiration. Direct cyst puncture can be performed with a small needle, trocar, or catheter with a suction-irrigation probe inserted directly into the cyst to drain its contents.^{62,63} Several strategies to avoid spillage have been described in the literature.^{52,64–67} Stabilization of the cyst under direct visualization can decompress the cyst, mitigate spillage, and make it possible to obtain cytologic specimens. Cyst decompression can be performed within an enclosed specimen bag to contain any spillage. The specimen bag should be inspected for integrity after removal. If spillage occurs, peritoneal lavage should be performed with liberal irrigation.^{68–71}

Specimen retrieval. Options can include mini-laparotomy via extension of a port site with retractors or via Pfannenstiel incision for extracorporeal excision; to prevent spillage, the cystic mass may also be contained within a specimen bag and brought outside the abdominal cavity⁷² using a protective barrier such as a sterilized surgical sheet⁷³ or moist gauze.⁷⁴ An alternative to mini-laparotomy is transvaginal or posterior colpotomy contained-specimen retrieval,^{75–78} which can be an effective technique to remove large solid or semisolid masses that are difficult to remove through laparoscopic ports. At the time of concomitant hysterectomy and adnexectomy, the cystic mass can be extracted vaginally through the colpotomy with the uterus.

Preventing formation of cystic masses after surgical management

Prophylactic oophorectomy in premenopausal women is not recommended for the prevention of cystic masses.

In women with recurrent hemorrhagic cysts or cyst rupture, especially those predisposed to bleeding (e.g., women with an inherited bleeding disorder or on anticoagulation therapy), suppression of ovulation with combined hormonal contraception can be considered.⁷⁹ Conversely, progestin-only pills and progestin intrauterine devices are associated with an increased formation of functional ovarian cysts.⁸⁰

In the patient with an endometrioma, combined hormonal contraceptives, progestins, or a levonorgestrel-intrauterine system is recommended, if pregnancy is not desired, in order to reduce the risk of recurrence.⁸¹

Monitoring after surgical management

Postoperative clinical or ultrasonographic monitoring is not recommended following surgical cystectomy or

oophorectomy if the mass is pathologically confirmed as benign.

For comprehensive recommendations on the potential benefits of opportunistic salpingectomy for preventing development of high-grade serous cancers of the ovary, fallopian tube, or peritoneum, refer to the joint Society of Obstetricians and Gynaecologists of Canada/Society of Gynecologic Oncology of Canada clinical practice guideline no. 344, Opportunistic Salpingectomy and Other Methods of Risk Reduction for Ovarian/Fallopian Tube/Peritoneal Cancer in the General Population, published in June 2017.⁸²

CONCLUSION

The management of ovarian masses characterized as benign on ultrasound has improved with the increased accuracy of ultrasound evaluation. Large studies following women with these masses have substantiated their long-term benign nature. Therefore, it is recommended that patients with asymptomatic benign masses <10 cm in diameter be followed conservatively. If the patient is symptomatic and premenopausal, ovarian cystectomy can be performed using a minimally invasive approach.^{2,3,8,10,17,83} If the patient is symptomatic and postmenopausal, bilateral salpingo-oophorectomy is recommended but with the decision based on the overall clinical picture and patient wishes. If the detected mass is characterized as indeterminate on initial ultrasound, options for management include repeat ultrasound at a short interval, referral to a specialized ultrasound consultant such as a radiologist or sonographer trained in pattern recognition for evaluation, and magnetic resonance imaging. Tumour markers may also be helpful in the decision-making process (consult companion guideline no. 403 on the initial investigation and management of adnexal masses). If malignancy is suspected on ultrasound characterization, the patient is best managed by a gynaecologic oncologist.⁸⁴

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APPENDIX**Table A1. Key to Grading of Recommendations, Assessment, Development and Evaluation (GRADE)**

Strength of Recommendation	Definition
Strong	High level of confidence that the desirable effects outweigh the undesirable effects (strong recommendation for) or the undesirable effects outweigh the desirable effects (strong recommendation against)
Conditional (weak) ^a	Desirable effects probably outweigh the undesirable effects (weak recommendation for) or the undesirable effects probably outweigh the desirable effects (weak recommendation against)
Quality of Evidence	Definition
High	High level of confidence in the effect estimate: Highly confident the true effect lies close to that of the estimate of the effect
Moderate	Moderate confidence in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low	Limited confidence in the effect estimate: The true effect may be substantially different from the estimate of the effect
Very low	Very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

^a Do not interpret conditional (weak) recommendations to mean weak evidence or uncertainty of the recommendation.

Adapted from GRADE Handbook (2013), Table 5.1, available at gdt.gradeapro.org/app/handbook/handbook.html.

Table A2. Implications of Strong and Conditional (Weak) Recommendations

Perspective	Strong Recommendation	Conditional (Weak) Recommendation
	<ul style="list-style-type: none"> • “We recommend . . .” • “We recommend to not . . .” 	<ul style="list-style-type: none"> • “We suggest . . .” • “We suggest to not . . .”
Guideline panel	The net desirable effects of a course of action outweigh the effects of the alternative course of action.	It is less clear whether the net desirable effects of a course of action outweigh the alternative course of action.
Patients	Most individuals in the situation would want the recommended course of action, while only a small number would not.	Most individuals in the situation would want the recommended course of action, but many would not.
Clinicians	Most individuals should receive the course of action.	Patient choices will vary by individual and clinicians should help patients arrive at a care decision consistent with the patient's values and preferences.
Policy makers, developers of quality measures	The recommendation can be adapted as policy in most settings. Adherence to this recommendation according to the guideline could be used as a quality criterion or performance indicator.	The recommendation can serve as a starting point but will require substantial debate and the involvement of many stakeholders.

Adapted from GRADE Handbook (2013), Table 6.1, available at gdt.gradeapro.org/app/handbook/handbook.html.