Screening for Ovarian Cancer

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Ovarian cancer is difficult to manage because the disease is most often diagnosed at an advanced stage when survival chances are poor. Early detection of ovarian cancer would increase long-term survival, since effective treatment modalities are available for early-onset disease. Screening with transvaginal ultrasound and serum CA 125 suggests promising results, but studies comparing mortality rates for screened vs unscreened populations are needed, and strategies must be developed for prevention or early diagnosis in order to control this disease process.

Introduction

Ovarian cancer is the most common cause of death among gynecologic malignancies and the fourth most common cause of cancer death in American women. In 1994, an estimated 24,000 new cases of ovarian cancer were diagnosed, and approximately 13,600 women died of the disease. In the United States, a woman's lifetime risk of developing ovarian cancer from birth to age 85 is approximately 1.5%. Ovarian cancer incidence is more common in white women and appears to be highest in North America and northern Europe and lowest in Japan. The mean age at diagnosis is 62 years, and the incidence increases with age and peaks in the sixth decade. The incidence rate of ovarian cancer increases from 15.7 per 100,000 per year in the 40-to-44 age group and peaks at a rate of 54 per 100,000 per year in the 75-to-79 age group. The National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program reports the average annual age-adjusted incidence was 13.7 per 100,000 during 1987. The prevalence in the United States is 30 to 50 per 100,000 women.[1] The five-year survival rate varies from 87.8% for stage Ia to 18% for stage IV disease with an overall five-year survival rate of 37%. The age adjusted mortality is 28.4 per 100,000 per year for women greater than 50 years of age.[2] Only 25% of women with newly diagnosed ovarian cancer present with stage I disease, and 75% present with malignant cells outside the ovaries at the time of diagnosis. Therefore, strategies must be developed for prevention or early diagnosis in order to control this disease process.

Theories of Cause and Natural History

Epithelial ovarian cancers are believed to arise from embryologic derivatives of the ovarian surface epithelium. Because epidemiologic factors associated with a reduced risk of ovarian cancer also are generally associated with a decrease in ovulation, ovarian cancer etiologic theories often are grouped into three categories: (1) incessant ovulation, (2) increased exposure to circulating pituitary gonadotropins, and (3) the presence of ovarian inclusion cysts, possibly secondary to minor trauma or increased proliferation of epithelium.

Efficacy of Screening

Requirements

An early diagnosis of any type of cancer often is assumed to provide an automatic benefit the patient, and any diagnostic test that can identify early stages of disease also is assumed to be useful for screening. However, certain requirements must be met for a screening test to be deemed effective (Table 1).[3] An optimal screening test is distinguished by high specificity, sensitivity, patient acceptance, and ease of performance. Based on the prevalence of ovarian cancer among American women, the positive predictive value of a screening test for ovarian cancer at 99.0% specificity in women 45 to 74 years of age is estimated to be approximately 4% (24 false-positive results for each case of ovarian cancer). Since no single test achieves this level of specificity, several unnecessary laparoscopies or laparotomies and their associated patient morbidity and financial costs would result unless screening tools and patient population are carefully selected.

Pelvic Examination

The current standard for screening women with ovarian cancer is the pelvic examination, which has a sensitivity of 67% for detecting a 4 X 6-cm mass. However, over a 15-year period, MacFarlane and co-workers[4] found only six ovarian cancers among 1,319 women who had undergone 18,753 pelvic examinations. Therefore, the pelvic examination alone is of limited value as a screening tool for the detection of early ovarian cancer.

Biochemical Tests

The ideal tumor marker, which would specifically detect a malignancy and would not be present in nonmalignant tissues, does not currently exist. Most tumor markers are nonspecific in that they are found in multiple types of malignancies as well as in normal and benign conditions (Table 2). A number of tumor markers have been studied for ovarian carcinoma, including CA 125, tumor-associated glycoprotein (TAG-72), NB/70K, CA 15-3, CA 19-9, urinary gonadotropin fragment, and placental alkaline phosphatase (Table 3).[5]
CA 125, the most extensively studied ovarian cancer-associated antigen, is a high molecular weight glycoprotein that is recognized by the murine OC 125 monoclonal antibody as an immunogen. A normal cutoff value of 35 U/mL generally is accepted. CA 125 levels are elevated (>35 U/mL) in more than 85% of women with ovarian cancer. CA 125 levels correlate with the stage of disease in that they are elevated in 90% of stage II, III, and IV disease but are elevated in only 50% of stage I disease.

The three largest studies pertaining to serum CA 125 measurements are the Janus study,[6] the Royal London Hospital study,[7] and the Stockholm study.[8] The Janus study used a serum blood bank of 39,300 stored samples of which 105 women developed ovarian cancer. Age-matched controls were assayed for CA 125 elevation. The ongoing Royal London Hospital study[7] is a prospective evaluation of 22,000 postmenopausal women using CA 125 levels and ultrasound in the screening for ovarian cancer. Measurement of CA 125 is the primary screen, and ultrasonography is the secondary test in the screening project. In the Stockholm study,[8] Einhorn and co-workers evaluated 5,500 healthy asymptomatic women with a serum CA 125. Elevations were followed clinically with ultrasound and serial CA 125 measurements.

The Janus study detected 11 cases of ovarian cancer at the prevalence screen, and three presented as interval cases within 12 months of the screen. Five presented as interval cases 12 to 24 months after screening, yielding a sensitivity of 79% at one year and 58% at two years of follow-up. Of the 5,500 women aged 40 years and older who were screened, 175 elevated CA 125 levels were found. Of these, six of the nine cases of ovarian cancer occurred where there was an elevated CA 125, yielding a similar sensitivity.

The specificity of serum CA 125 estimation among postmenopausal women is 98% in the ongoing Royal London Hospital study. The CA 125 has a lower specificity in premenopausal than postmenopausal women, presumably because of a rise in levels associated with menstruation and benign disorders. The specificity is similar to the specificity of ultrasound alone and would not be acceptable in a screening of the general population. With a prevalence of 40 per 100,000 per year in women older than 45 years of age and a specificity of 98%, 50 false-positive results would occur for each case of ovarian cancer (Table 4).[9]

Chen et al[10] evaluated patients with elevated CA 125 levels and pelvic masses and found a false-positive rate of 40% at a level less than 35 U/mL. When the cutoff was raised to higher levels, both the sensitivity and the false-positive rate were reduced. Some investigators have used multiple tumor markers to try to enhance the specificity of screening. At the Royal London Hospital study, the best combination was CA 125 and O VX-1. The combination of either a CA 125 level of more than 25 U/mL or an O VX-1 level of more than 12 U/mL achieved a sensitivity of 80% and a specificity of 91%. Soper and colleagues[11] added TAG-72 and CA 15-3 to CA 125 and found the sensitivity for detection of malignancy was 81% with a specificity of 100% for those older than age 50 years.

On the horizon is the development of a new antigen, CA 130, located in the same glycoprotein as CA 125 but at a distinct ectopic site. The CA 130 site is recognized by two different monoclonal antibodies. Hosono et al[12] evaluated 8,000 samples and found that the specificity and positive predictive value of CA 125 was enhanced when the CA 130 was used together with a CA 125 level.

CA-125 does not provide adequate specificity for mass screening.

**Diagnostic Tests**

Transabdominal ultrasonography (TAS) and transvaginal ultrasonography (TVS) have been studied as noninvasive screening tools, and TVS currently is the preferred modality. The potential success of ultrasound imaging is based on its ability to detect early morphologic changes that accompany ovarian oncogenesis. In a prospective study[13] of ultrasonic ovarian cancer screening consisting of 5,479 women aged 18 to 78 using TAS, 326 (5.9%) women were found with persistently abnormal ovarian morphology. At laparotomy, five patients with stage I ovarian cancers were identified, of which there were three borderline tumors; four had metastatic ovarian cancers, and 255 had benign ovarian lesions. The odds of detecting primary ovarian cancer were 1:67.

In a screening[14] of 3,220 asymptomatic postmenopausal women with TVS, 44 (1.4%) morphologic ovarian abnormalities were detected, only 16 of which were clinically appreciated. These patients were taken to surgery to find 41 benign ovarian pathologies, two stage I ovarian cancers (one granulosa and one epithelial), and one stage IIIb ovarian cancer. Serous cystadenomas were found in 21 women, thereby possibly preventing a possible premalignant condition from proceeding to cancer.

Morphologic scoring systems are being developed to improve the accuracy of TVS. Three criteria being evaluated are size/volume, papillary projections from the cyst wall, and cyst complexity. In a study by Granberg et al,[15] papillary projections correlated highly with malignancy and was the most ominous and reliable finding. DePristo et al[16] and others have all proposed morphologic scoring systems to predict malignancies in the ovary. Of the 11,283 women scanned, the overall specificity was approximately 96% with a positive predictive value of 3.1% (Table 5).[16] Morphology indices are difficult to standardize and associated with an increased risk of false-negative studies.

The use of color Doppler imaging (CDI) has been coupled with TVS to detect specific flow patterns associated with malignancy. Dividing cancer cells are believed to yield a similar sensitivity.

The use of CDI has reduced the false-positive rate of ovarian cancer detection but at additional expense to the patient. Because of the low prevalence of disease in the general population, some studies have focused on high-risk populations such as older women or women with a family history of the disease. Bourne et al[18] screened 1,601 women ages 17 to 79 with a family history of ovarian cancer by TVS and CDI. All patients with abnormal TVS received CDI and a morphology index as the secondary screen. A total of 909 women (57%) required follow-up scans, but only 61 patients (3.8%) ultimately went to surgery for exploration. Six ovarian cancers were found (five stage I and one stage III), and three of these had low malignant potential.

In a screening[19] using TVS and CDI for 597 women aged 35 to 80 years with a family history of ovarian, endometrial, or colon cancer, 115 women (19%) had initially abnormal scans. Nineteen patients went to surgery to find one stage Ia borderline ovarian cancer tumor, one stage I grade 3 endometrial carcinoma, and 18 ovarian masses.
benign adnexal pathologies. Muto and colleagues[20] used TVS and CDI on 386 patients aged 20 to more than 60 years with a family history of ovarian cancer. Fifteen patients with persistent ovarian masses went to surgery, and all of these masses were benign. Due to other study parameters, 21 additional patients underwent surgery, but no ovarian cancers have been reported to date.

Table 5 summarizes all of the above reports. At one year of follow-up, all of the studies showed sensitivities of approximately 100%. Of the 11,283 women screened and 485 surgical procedures, only 13 stage I ovarian cancers were identified, and only five of those were epithelial histology. To diagnose one stage I ovarian cancer, 32 surgeries (95%, CI=8-41) were required. If screening is administered to only those women with a family history of ovarian cancer, 17 surgeries (95%, CI=8-41) would be required to find one stage I cancer.

The above studies demonstrate that TVS screening is optimal in postmenopausal women where ovarian volume does not vary on a physiologic basis. When applied to the premenopausal age group, 60% of ovarian abnormalities disappear spontaneously and no cancers are detected. Screening women older than 50 years of age increases the positive predictive value. However, familial ovarian cancer occurs at a lower median age (47 years vs 59 years), making it difficult to design a screening program.[21] A standardized morphology index may help to identify a true high-risk patient requiring surgery. The screening interval is unknown because the lag time for ovarian cancer to develop and metastasize remains unknown. New technologies, including three-dimensional ultrasonography coupled with CDI, may decrease the false-positive rates of ovarian cancer screening.

Other Diagnostic Tests

Other radiologic techniques, including computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET) are sometimes helpful in the identification and follow-up of bulky ovarian cancer with metastatic disease or ascites. Their role in screening is of limited value. Because of the subtle differences of radiographic attenuation in soft tissues and the gastrointestinal tract, CT scanning is associated with a high false-negative rate in early ovarian cancer. CT scanning appears more sensitive than ultrasound but is associated with a lower specificity.[22] In addition, the necessity of using intravenous contrast to optimize its use in gynecology and the cost of CT scanning make this modality unacceptable as a screening tool.

MRI offers a multiplanar, noninvasive evaluation of soft tissue masses in the pelvis by measuring differences in hydrogen content, magnetic relaxation times, and the blood flow through the tissue.[23] MRI is most notable for delineation of endometriosis and mature cystic teratomas. Both MRI and CT have a low sensitivity for identifying peritoneal implants. Because of the low sensitivity and high cost, MRI also is unacceptable as a screening modality.

PET images tissue based on its biochemistry. Using 2-18F-fluoro-2-deoxy-D-glucose (FDG), PET has successfully visualized primary and metastatic ovarian carcinomas. As new radiopharmaceuticals are developed to improve resolution and sensitivity, PET scans may prove to be useful in the evaluation of the adnexa.[24]

Monoclonal Antibodies

Monoclonal antibodies directed against cancer-associated antigens have been combined with gamma-emitting radionuclides to visualize some solid tumors including breast, colorectal, and prostate cancer.[25] At least 17 different monoclonal antibodies have been characterized that are reactive with epithelial ovarian cancer, and at least eight of these have been administered to ovarian cancer patients. In patients with known ovarian cancer, the true-positive rate has been 80% to 95%. A false-negative rate of 10% to 20% and a false-positive rate of 50% are noted in the scans performed. The false-negative scans include tumor metastasis less than 1 cm, tumor necrosis, and undifferentiated tumors for the B72.3 antibody studies.[26] Indium 111-CYT-103 immunooscintigraphy (with radionuclide labeling) and the B43.13 antibody combined with whole-body imaging using single positron emission computed tomography (SPECT) have been performed in known ovarian cancer patients. However, these tests are costly, and the studies are in the preliminary stages of development.[27] At this time, the OncoScint test is the only radioimmunodiagnostic test approved by the Food and Drug Administration. Its potential future impact would be a direct cancer cell diagnosis and therapy with minimal effect on the surrounding normal tissue. However, highly specific monoclonal antibodies have been identified that would make treatment practical at this time.

Identification of a High-Risk Population

Probably the most significant risk factor for ovarian cancer is advancing age. The risk of developing ovarian cancer increases from 15.7 to 54 per 100,000 women as one ages from 40 to 79 years. Other risk factors include nulliparity, North American or northern European descent, a personal history of endometrial, colon, or breast cancer, and a family history of ovarian cancer. Evidence implicating the use of fertility drugs as an isolated risk factor is inconsistent.[28,29] Factors such as estrogen replacement therapy, smoking, and age at menarche, menopause, and first birth appear to have little or no effect on risk. Protective factors are the increasing number of pregnancies (whether full-term or not), increasing length of oral contraceptive use, and increasing duration of lactation, supporting the theory of incessant ovulation in the development of ovarian cancer. Four case-control studies reported an excess risk of ovarian cancer associated with perineal tear exposure, although the risk increase was not statistically significant.[30]

In summary, risk factors for ovarian cancer development are related to ovarian activity, and factors associated with reduced ovulation are associated with a reduced risk.

Genetic Ovarian Cancer
Screening for ovarian cancer in the general population, regardless of age, is not recommended with presently available tools. Nonetheless, certain high-risk segments of the population may benefit from screening. One clear risk factor for the development of epithelial ovarian cancer is a family history of the disease. Approximately 7% of ovarian cancer patients report a family history; of these patients, 90% report only one relative. The lifetime risk of the development of ovarian cancer is related to the number of first-degree relatives (mother, sister, daughter) with ovarian cancer, as well as the identification of a specific hereditary syndrome (Table 6).[31] The age of onset of ovarian cancer in the family history also is important in determining a lifetime risk. Based on an analysis of 391 pedigrees from women who were self-referred to an ovarian cancer screening clinic, Houlston et al[32] estimated a lifetime risk of 20% in first-degree relatives of women who develop ovarian cancer before the age of 45 years. Because of self-referral bias, the estimate of 20% may be inflated, but the importance of early age of onset in the family history remains.

Estimates of the contribution of specific hereditary ovarian cancer syndromes to the total ovarian cancer burden vary from less than 1% to 10%. Three syndromes that have been identified to date include the site-specific ovarian cancer syndrome, the breast-ovarian cancer syndrome, and the Lynch syndrome II, which is characterized by early-onset colon cancer and an excess of ovarian and endometrial cancers. As is typical of hereditary cancer syndromes in general, all of these syndromes are characterized by early age of onset. The mean age of onset of ovarian cancer in the general population is 59 years compared with 50.6 in the breast-ovarian cancer syndrome, 49 in the site-specific ovarian cancer syndrome, and 45 in the Lynch syndrome II. Statistical analysis of these age differences reveals a highly significant difference between the age of onset in the general population and the age of onset in the hereditary syndromes as a whole.[33,34] In addition, the differences between the syndromes were significant, although the P value was only 0.05. These syndromes are characterized by an autosomal dominant inheritance pattern with regard to the major cancer in the group (ie, ovarian cancer in the site-specific syndrome, breast cancer in the breast-ovarian cancer syndrome, and colon cancer in the Lynch-type II syndrome). The exact risk of ovarian cancer development in the latter two syndromes is unknown, although it is in excess of the general population of women without hereditary cancers. With an autosomal dominant inheritance pattern, 50% of patients with the specific ovarian cancer syndrome will inherit the trait. The penetrance of the trait is thought to be approximately 80%, so the risk of developing the disease is approximately 40%.

The diagnosis of a hereditary ovarian cancer syndrome requires the construction of an informative pedigree from the family history. Many obstacles make this process difficult, if not impossible (Table 7). Genetic markers have not yet been discovered that can identify patients with a hereditary syndrome with the exception of the breast-ovarian cancer syndrome. Using genetic linkage analysis, Hall et al[35] identified chromosome 17q 12-21 as the location of the BRCA1 gene, which appears to encode a tumor suppressor gene. The functional BRCA1 protein that is present in normal breast and ovarian epithelial tissue is altered, reduced, or absent in some breast and ovarian tumors. It is estimated that BRCA1 mutation female carriers have an 85% risk of developing breast and/or ovarian cancer. Presently, carriers of this gene can be identified only in special research settings. Screening for BRCA1 mutations is likely to be the first widespread presymptomatic genetic screening test to emerge in general medicine practice. Geneticists and treating physicians will need to provide extensive counseling to their patients, since disclosure of such information will have substantial psychological and economic ramifications.[36-39]

Screening is warranted for women whose family history reveals a specific hereditary syndrome. This policy is best summarized in the following statement from the National Institutes of Health's Consensus Development Conference on Ovarian Cancer held in April 1994: “There are no data demonstrating that screening these high-risk women reduces their mortality from ovarian cancer. Nonetheless, annual rectovaginal examination, CA 125 determination, and transvaginal ultrasonography are recommended in these women until childbearing is completed or at age 35, at which time prophylactic bilateral oophorectomy is recommended to reduce this risk.”

Prophylactic oophorectomy does not guarantee that these patients will not develop a peritoneal carcinomatosis. Primary peritoneal neoplasms occasionally arise from coelomic epithelium, and residual embryonic tissue may give rise to neoplasia that resembles ovarian carcinoma. The exact risk of this occurrence is unknown. [40] Piver et al[41] reported six cases in 324 women from the Gilda Radner Familial Ovarian Cancer Registry who underwent prophylactic oophorectomy with follow-up ranging from one to 27 years.

A prophylactic oophorectomy is not recommended for women with one first-degree relative with ovarian cancer. The possible exception is the woman whose relative developed ovarian cancer before the age of 45 years. Piver and colleagues[42] recommend screening and prophylactic oophorectomy for women with two or more first-degree relatives with ovarian cancer, although the majority of these women will not have a family pedigree documenting a specific hereditary syndrome. Lynch et al[43] recommend prophylactic oophorectomy for only those patients who have completed their families and whose risk for development of ovarian cancer approaches 50%. This is particularly important for women in direct cancer-prone lineage of breast-ovarian cancer families who have already manifested breast cancer. These women are obligate gene carriers, and prophylactic oophorectomy is of the highest importance. The current recommendations by the American College of Obstetricians and Gynecologists regarding a prophylactic oophorectomy to prevent epithelial ovarian cancer are shown in Table 8.[44]

**Molecular Biology and Screening**

Tumor development has been associated with aberrant, dysfunctional expression and/or mutation of various genes, including oncogene overexpression, amplification or mutation, aberrant tumor suppression (antioncogene) expression or mutation, and the inappropriate expression of cytokines, growth factors, or cellular receptors for cytokines and growth factors.

Because ovarian epithelium must proliferate to heal cyst rupture (from ovulation, etc), ovulation must be associated with the growth and/or differentiation of ovarian epithelial cells. Cytokines and growth factors, including transforming growth factor-alpha (TGF-alpha) and interleukin-6 (IL-6), have been found in ovarian follicular fluid. With repeated ovulation and healing, a greater chance of a genetic accident in DNA replication exists that could activate an oncogene or inactivate a tumor suppressor gene.

Aberrant expression of various oncogenes in ovarian cancer includes HER-2/neu, c-fms, ras, myc, myb, and macrophage/monocyte colony-stimulating factor (M-CSF). In addition to HER-2/neu being overexpressed in breast cancer, normal ovarian epithelium expresses low–moderate levels. HER-2/neu is overexpressed in 30% of ovarian malignancies and appears to be indicative of a poor prognosis and survival. When HER-2/neu overexpression was seen, these ovarian cancer cells were more resistant to tumor necrosis factor (TNF) or lymphokine-activated killer-cell–mediated lysis. Both M-CSF and fms are expressed in many ovarian cancer cells. The levels of fms transcripts correlate strongly with high grade and advanced clinical stage ovarian cancers.[45]

The p53 tumor suppressor gene on chromosome 17p is overexpressed in 30% to 50% of ovarian cancers. The p53 gene product appears to regulate cellular growth and development. Mutations result in a dominant transformed phenotype, preventing the formation of a functional DNA-binding, regulatory complex. The retinoblastoma locus is another antioncogene seen in ovarian cancer.

Growth factors and cytokines play an important role in the development and growth of cancer. Epithelial ovarian cancer may in fact be a cytokine–propelled disease. TGF-beta, TGF-alpha, and epidermal growth factor have been evaluated. TNF-alpha, IL-1, M-CSF, and IL-6 may also play important roles in ovarian cancer. M-CSF is elevated in 70% to 80% of ovarian cancers and produces other cytokines including IL-1 and IL-6, whose exact roles are unclear. Thus, M-CSF may modify the tumor cell environment, resulting in enhanced tumor cell growth.

The cytokine IL-10, along with other cytokines, has been found in the peritoneal cavity. IL-10 is believed to be a cytokine synthesis inhibitory factor, suppressing the release of IL-1, IL-6, IL-8, and TNF-alpha. Studies are underway to determine whether a specific cytokine/tumor marker/facet phase reactive pattern could be useful in monitoring the progress of patients with ovarian cancer. The levels of various cytokines in ascites also are being evaluated to determine if certain cytokines could...
result in a peritoneal environment that is immunodeficient, is unresponsive, and promotes tumor growth.[46]

Guidelines for Primary Care

Ovarian cancer is the fourth leading cause of cancer deaths in American women. It is a difficult disease to manage since 70% of women have metastatic disease at the time of diagnosis, and the overall five-year survival is only 37%. Since 85% to 90% of patients with early-stage ovarian cancer survive, screening would be useful if appropriate tools are developed.

Pelvic examination is an inadequate screening tool. Tumor markers have been tested, most notably serum CA 125. The sensitivity and specificity are inadequate for screening, particularly in premenopausal women. While the specificity improves in postmenopausal women with the prevalence of the disease, the false-positive to true-positive ratio is 50:1. Another problem associated with serum CA 125 is that 50% of patients with early-stage ovarian cancer do not have an elevated value.

Of the various imaging tests that have been suggested, the most accurate modality is ultrasonography, particularly transvaginal ultrasonography. More than 11,000 women have been screened with pelvic ultrasonography and have been reported in the medical literature.[16] As with serum CA 125, specificity was inadequate for screening, and the false-positive rate was unacceptably high, even when morphology indices and color Doppler imaging were added.

Presently, routine screening for ovarian cancer in the general population is not recommended by the American College of Obstetrics and Gynecology.[47] The Society of Gynecologic Oncologists concurs that data are insufficient to recommend any routine screening for ovarian cancer. There has been interest in screening high-risk groups, eg, women of advancing age or those with a family history of ovarian cancer, but unacceptable specificity and false-positive rates associated with general screening remain in screening these high-risk women. For this reason, the Early Detection Branch of the National Cancer Institute has launched a large randomized clinical trial to screen for prostate, lung, colon, and ovarian cancers (PLCO), which will include 74,000 postmenopausal (over 60 years old) women randomized to screening or to routine care. The endpoint will be patient mortality, the testing will include CA 125 and transvaginal sonography, and the patients will be followed for at least 10 years.

Screening is recommended for some very high-risk women, ie, those with a specific inheritable ovarian cancer syndrome or with two first-degree relatives with epithelial ovarian cancer. The current recommendation for these patients is annual rectovaginal examination, serum CA 125, and transvaginal ultrasonography until either childbearing is complete or the woman reaches 35 years of age. At that point, prophylactic oophorectomy is recommended. Further research in ovarian cancer screening includes identification of new tumor markers and imaging tools, as well as a multiyear randomized study sponsored by the NCI comparing annual pelvic examination alone with pelvic examination, serum CA 125, and transvaginal ultrasonography.

Prevention of ovarian cancer is an important adjunct to screening. Oral contraceptives have been shown to have a protective effect. As of yet, there is no recommendation regarding the use of oral contraceptives as a preventive measure. This concept, however, deserves further study.

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References


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