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## Ovarian Cancer: Causes, Treatments And Prognosis

In the female reproductive system, a woman has one ovary on each side of her uterus, and these ovaries produce both hormones and eggs for fertilization when a woman procreates (Mayo Clinic Staff). Fallopian tubes are “a pair of long, slender tubes on each side of the uterus” and are attached to the ovaries (“Basic Information About Ovarian Cancer”). The peritoneum is the lining of tissue that can be found on generally any organ in the abdomen of a female body (“Basic Information About Ovarian Cancer”). In a general sense, cancer can occur as a result of mutations in certain genes, which then cause growth of abnormal cells. Accumulation of these cells allow them to grow uncontrollably and spread all over the body (“Basic Information About Ovarian Cancer”). These cells do not die – they grow, divide, and multiply, allowing them to take over certain body parts (“What Is Cancer?: Common Forms and Oncology Treatment Options”). Different types of cancer occur because, and are named for, their different spots of origin in the body (“Basic Information About Ovarian Cancer”). Combination of these two things, ovaries and cancer, results in ovarian cancer. Ovarian cancer is a type of cancer in women that can originate in the ovaries, fallopian tubes, peritoneum, or any nearby related area of the female body. About 1 in 75 people who have ovaries get ovarian cancer in their lifetime. Every year, nearly 21,000 women are diagnosed in the US, and 14,000 women die each year (Planned Parenthood). Ovarian cancer has some genetic properties, which can be linked to family members having mutations in the breast cancer susceptibility genes, which will be discussed later (“Basic Information About Ovarian Cancer”). This is why it may be important for women to know their body, know what is normal, and know their family history, if possible.

In this report, ovarian cancer will be discussed, more specifically its causes, symptoms, diagnosis, prevention, treatments, and prognosis. Some statistics of the disease will also be presented. With the information presented about ovarian cancer in this report, hopefully people can be more informed of this topic and better understand ways to deal with ovarian cancer, whether it be for themselves as a patient or to care for a loved one who is suffering from this type of cancer.

There are three types of ovarian cancer: epithelial tumors, stromal tumors, and germ cell tumors, which will all be further discussed later in the report (Mayo Clinic Staff). Although the specific cause of ovarian cancer remains to be unknown, some of the risk factors that increase chances of obtaining this cancer have been identified (Mayo Clinic Staff). Cancers in general occur from a gene mutation in DNA, which encourages the cells to grow and metastasize quickly. Specifically, in ovarian cancer, one of the main risk factors is a gene mutation in breast cancer gene 1 (BRCA1) and breast cancer gene 2 (BRCA2), and other gene mutations that can be associated with Lynch syndrome (Mayo Clinic Staff). Old age is another risk factor of ovarian cancer as women from ages 50-60 are more susceptible to being diagnosed; however, women of any age are able to obtain the disease. A few other risk factors include family history, estrogen hormone replacement therapy, and early menstruation or early menopause (Mayo Clinic Staff).

In ovarian cancer, symptoms typically do not occur until the disease progresses into the advanced stage. These symptoms that can possibly arise include abdominal bloating, quick

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feelings of satiety upon eating, decrease in weight, pelvic discomfort, abnormal bowel movements, and frequent urination (Mayo Clinic Staff). Most of these symptoms are very mild and can occur for multiple reasons, which is why ovarian cancer is often mistaken for less severe diseases. Once a doctor detects that ovarian cancer could be possible, there are multiple different routes for a diagnosis. Pelvic exams are performed as a diagnostic exam, during which the doctor “inserts gloved fingers into the vagina and simultaneously presses a hand on the abdomen in order to feel the pelvic organs. The doctor also visually examines the external genitalia, vagina, and cervix” (Mayo Clinic Staff). Image testing is another diagnostic test, which includes ultrasounds and CT scans in order to determine specifics about women’s ovaries (Mayo Clinic Staff). Another diagnostic test is a blood test, in which a doctor can test organ function, and more specifically, look for tumor markers which can indicate the presence of ovarian cancer (Mayo Clinic Staff). If these tests seem to be unhelpful in diagnosing ovarian cancer, some doctors may perform surgery as the last diagnostic test in order to remove an ovary and have it tested to determine whether or not it is malignant (Mayo Clinic Staff).

One of the most important factors in determining the prognosis of ovarian cancer is knowing in which stage the cancer has been detected. There are four stages in ovarian cancer, stages one through four, and each stage gets progressively more harmful (Pietrangelo). Identifying which stage of ovarian cancer a patient is in can more easily allow the doctor to identify the nature of the cancer and the most appropriate way to advise a plan of action for treatment. For stage one of ovarian cancer, the cancer has only been found in the ovaries (Pietrangelo). There are different substages for stage one, which are 1A, 1B, and 1C. In 1A, the cancer is only in one of the ovaries, and in 1B, the cancer is in both of the ovaries. Stage 1C is stage 1B plus the presence of either damage to the capsule or fluid in the belly (Pietrangelo). In stage two, cancer is present in the ovaries and has then metastasized into the pelvic organs. Stage 2A is demonstrated once the cancer has migrated from the ovaries to the fallopian tubes or uterus. Stage 2B is demonstrated once the cancer has moved to pelvic organs, including the bladder, sigmoid colon, or rectum (Pietrangelo). Once the ovarian cancer has reached level 3, the cancer has now been identified in the ovaries, abdominal lining, or abdominal lymph nodes. In stage 3A, the cancer has been seen in pelvic organs, lymph nodes in the pelvis area, or the lining of the abdomen. Once the cancer progresses onto stage 3B, it has then metastasized into nearby pelvic organs. In stage 3C, the cancer cells can now be found outside the spleen, liver, or lymph nodes (Pietrangelo). As one can assume, stage four is the highest and most severe stage of ovarian cancer, and at this stage, the cancer has progressed into distant organs or general areas of the patient’s body. In stage 4A, the fluid around the lungs have now been invaded by cancer cells, and in stage 4B, it has spread to the inner spleen, inner liver or more severe body organs or major internal body elements including the skin, brain, or the lungs (Pietrangelo). A figure is shown below to visualize the differences that occur in each stage (Nocc).

The other important factor in determining prognosis for ovarian cancer is knowing which type of ovarian cancer the patient seems to have. As mentioned before, the three types of ovarian cancer are epithelial, germ cell, and stromal. Epithelial tumors grow on the outer ovary lining, germ cell tumors grow in egg-producing cells, and stromal tumors occur in hormone-releasing cells (Nocc). Epithelial ovarian tumors are the most common and occur in 90% of ovarian cancer patients, and they are also the most dangerous. Unfortunately, nearly 75% of patients diagnosed with this subtype are diagnosed in the advanced stage of this cancer (Nocc).

Germ cell ovarian tumors account for nearly 5% of ovarian cancer, and they typically occur in women from ages 13 to 29 (Nocc, “Learn About Types of Ovarian Cancer”). Some of the “most

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common germ cell malignancies are maturing teratomas, dysgerminomas, and endodermal sinus tumors” (Nocc). Stromal tumors are most rare, accounting for approximately 2% of ovarian tumors, and they are usually considered low-grade. Stromal cell tumors include granulosa cell tumors which are of the cells in the granulosa, cells in the theca, and fibroblasts (Nocc).

The other small percentage unaccounted for is for benign epithelial ovarian tumors (“Learn About Types of Ovarian Cancer”). Currently, there is no definitive way to prevent a woman from obtaining ovarian cancer, but there are a couple ways to attempt to decrease the risk of obtaining it. Women who take oral contraceptives are at a lower risk for obtaining ovarian cancer than women who do not, so women may consider taking birth control (Mayo Clinic Staff). A patient should consult her doctor to find out if birth control is a good option for her. Patients should also consult their doctor about the risk factors that could increase a woman’s chances of obtaining ovarian cancer in order to be informed, which is the second preventative measure that a woman can take (Mayo Clinic Staff). Women should inform their doctor about any family history of ovarian or breast cancer, and the doctor will then decide which course of action may be best. The doctor may refer his or her patient to a genetic counselor at this point so that the patient can determine their risk for cancer, or the doctor may choose any other step at this point.

There are multiple forms of treatment for patients with ovarian cancer, but there is still no cure for the disease, which is consistent with most cancers. The most common treatment options are chemotherapy and surgery. Chemotherapy is a generalized therapy for the majority of cancer types; it “uses chemicals to kill fast-growing cells in the body, including cancer cells” either by injection or orally (Mayo Clinic Staff). Some surgical procedures include the removal of one or both ovaries, removal of the uterus, and removal of anything else that has been invaded by the cancer cells for more advanced forms of ovarian cancer (Mayo Clinic Staff). For the removal of an ovary, a doctor will remove the “affected ovary and its fallopian tube,” which can preserve a woman’s ability to procreate (Mayo Clinic Staff). In cases where both ovaries and both fallopian tubes are removed, the uterus still remains intact, “so women may still be able to become pregnant with the use of frozen embryos or eggs or eggs from a donor” (Mayo Clinic Staff). For women with more severe and advanced forms of ovarian cancer, they may choose to forego their ability to have children and allow doctors to surgically remove their ovaries and fallopian tubes, along with the uterus, surrounding lymph nodes, and omentum (Mayo Clinic Staff). For most severe and most advanced cases, doctors may encourage the patient to undergo both chemotherapy and surgery in order to remove anything of which the cancer has metastasized (Mayo Clinic Staff).

Two other forms of therapy are options for patients with ovarian cancer. Targeted therapy uses medication that specifically targets the weak points in cancer cells, and it is typically used when the cancer has returned from an initial state or when the cancer seems to be resistant to other treatment options. For this type of therapy, doctors will perform tests to see which type of targeted therapy is the most appropriate and may be the most effective for each patient individually (Mayo Clinic Staff). Palliative care is the final form of therapy, and it allows the patient to be more at ease from pain and feel as comfortable as possible during harsh treatments such as chemotherapy. Doctors, nurses, and other specialized medical professionals are equipped to perform this type of therapy (Mayo Clinic Staff).

In conclusion, ovarian cancer can be a cause for concern in women of any age as it is a

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common cancer in the US. With risk factors including gene mutations of the breast cancer genes, old age, family history, and early menstruation or early menopause, women should be informed of their chances and know what may be normal in their own bodies. Most symptoms for ovarian cancer in women, such as bloating, weight loss, frequent urination, and others, can be mistaken for other minor diseases or infections, which is why ovarian cancer is typically caught in the later stages when the disease has progressed significantly (Mayo Clinic Staff). As stages progress, the disease grows and worsens in the body. Diagnosis can be done once ovarian cancer is performed by any of the following diagnostic tests: pelvic exams, visual examinations, ultrasounds, CT scans, blood tests, and surgery. As most cancers are, ovarian cancer can be very harmful, yet it can be treated with chemotherapy, surgeries, and other types of general therapy (Mayo Clinic Staff). Prognosis of ovarian cancer differs between cancer types and depends on which stage the cancer may be caught, but in general, 1 out of 75 people with ovaries are diagnosed with ovarian cancer. 21,000 people are diagnosed per year, and 14,000 people die from the disease (Planned Parenthood). In order to possibly decrease the chances of obtaining ovarian cancer, women may consider taking oral contraceptives. Women should also be informed of their family history, genetics, and specifics regarding their body, and they should inform their doctor of anything of major importance in attempt to catch the disease at the earliest stages if it is present in the body (Mayo Clinic Staff).

With ovarian cancer being as common as it is, women should get checked regularly and follow their doctors' advice. Attending all scheduled gynecologic appointments with their doctor and keeping all exams up to date is crucial in order to maintain a healthy body and to know what might be occurring.