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Adnexal Masses and Polycystic Ovarian Syndrome (PCOS)

Section 1: Introduction

Adnexal masses and polycystic ovary syndrome (PCOS) can have a big impact on the health of female patients. Adnexal masses can range from benign to malignant and have serious consequences on fertility and overall health. PCOS is the most common hormone disorder for female patients and can also affect the fertility and overall health of female patients. It is important for healthcare providers to understand the signs and symptoms of adnexal masses and PCOS in order to identify appropriate nursing interventions for their patients.

Research shows that the lack of female representation has resulted in limited information about how female reproductive health is impacted by external factors and chronic conditions such as PCOS. Healthcare providers may be unfamiliar with adnexal masses and female reproductive conditions such as PCOS. Patients may not be aware that their symptoms are related to a reproductive disorder or may struggle with misdiagnosis. Over the years, healthcare organizations have started to incorporate female reproductive health into primary practice. However, there is still much to be learned about female reproductive health and chronic conditions impacting patients. In this course, participants will learn about the female reproductive system and menstrual cycle, the different types of adnexal masses, signs and symptoms of adnexal masses and PCOS, the diagnostic criteria for adnexal masses and PCOS, and different methods of treatment.

Section 2: Understanding the Menstrual Cycle and Reproductive Hormones

References: 10, 13, 14, 15, 16, 17, 18, 19, 27

Understanding the female reproductive system is crucial to understanding how it is affected by conditions such as adnexal masses and PCOS. The female

reproductive system is complex and can be impacted by many factors including hormone imbalances. The impact of reproductive hormone imbalances on the female reproductive system is often misunderstood by healthcare providers. Research shows that the lack of female representation has resulted in limited information about how external factors, such as medications and lifestyle, can impact female reproductive health. Over the years, healthcare organizations have started to incorporate female reproductive health into primary practice. However, there is still much to be learned about female reproductive health and conditions impacting patients such as adnexal masses and PCOS.

Female Reproductive Organs

The female reproductive system is comprised of several different reproductive organs including the vagina, cervix, uterus, ovaries, and fallopian tubes. The vagina is the part of the female reproductive system that connects the cervix to the outside of the body. The vaginal canal expands when it is time to give birth to allow the baby to pass through. The cervix is the lowest part of the uterus and also expands to allow the baby to pass from the uterus during delivery. The uterus is the female reproductive organ that contains the fetus during pregnancy. The uterine lining thickens during the menstrual cycle to prepare for the implantation of an egg from the ovaries. The ovaries are two small glands located on either side of the uterus. The ovaries produce eggs and female reproductive hormones. The fallopian tubes connect the ovaries to the uterus. They are two narrow tubes that allow the egg to travel from the ovaries to the uterus for implantation. Understanding the different female reproductive organs can help understand how the menstrual cycle works. The different reproductive organs each play a key role in the menstrual cycle.

The Menstrual Cycle

Understanding the different phases of the menstrual cycle helps to understand the effects of female hormone imbalances, especially related to adnexal masses and PCOS. The menstrual cycle is controlled by female reproductive hormones to help prepare the body for pregnancy. The length of the menstrual cycle can vary, but should occur every 21 to 35 days. Symptoms associated with different phases of the menstrual cycle can also vary person to person. Some females may experience more severe symptoms than others during their menstrual cycle.

The menstrual cycle includes four phases:

- Menses
- Follicular phase
- Ovulation
- Luteal phase

The menses phase is when menstruation, also known as a period, occurs. Menstruation is the shedding of the lining of the uterus if pregnancy does not occur, resulting in bleeding. Most females bleed for 3 to 5 days. Females may experience some symptoms such as nausea, abdominal cramping, bloating, and mood changes during the menses phase. If pregnancy occurs, females will not have the menses phase and can have a missed period.

The follicular phase begins with menstruation and ends when ovulation occurs. During the follicular phase, the female reproductive hormone called estrogen increases. Increased estrogen triggers the thickening of the uterine lining to prepare the uterus for a fertilized egg. Follicle stimulating hormone (FSH) is another female reproductive hormone that causes follicles in the ovaries to grow. At the end of the follicular phase, the follicles will mature into an egg to be

released for fertilization.

Ovulation is the phase when the ovaries release a mature egg to be fertilized. Luteinizing hormone (LH) is the female reproductive hormone that stimulates the ovaries to release an egg. Ovulation usually occurs about halfway through the menstrual cycle and is when females are considered fertile. If a person is trying to get pregnant, they can track their cycle to help determine when they are ovulating for their best chance at getting pregnant. Females on average ovulate around 24 hours during their cycle, but can be ovulating more or less.

The luteal phase is when the egg travels from the ovaries to the uterus. If the egg is fertilized, it will implant in the uterine wall. The female reproductive hormone called progesterone increases which helps thicken the uterine lining. If the egg is not fertilized, estrogen and progesterone will decrease, and menstruation occurs.

The menstrual cycle first begins at the start of puberty. The average age to begin menstruation is 12 years of age, but females can start menstruation as young as 8 years of age or as old as 16 years of age. The menstrual cycle continues through childbearing years until the start of menopause. Menopause is the ceasing of menstruation and usually occurs around 50 years of age. Female reproductive hormones will fluctuate during menopause and ultimately decrease so ovulation no longer occurs.

Irregular Menstrual Cycles

Irregular menstrual cycles are very common and can occur due to many different factors. Sometimes the cause of an irregular menstrual cycle is unknown. The criteria for an irregular menstrual cycle includes:

- Menstruation occurring less than 21 days or more than 35 days apart
- No menstruation for more than 90 days

- Bleeding that is considered unusually heavy or light
- Bleeding for more than 7 days
- Severe premenstrual syndrome (PMS) symptoms such as pain, cramping, and nausea
- Bleeding in between menstruation cycles

Irregularities in the menstrual cycle can occur intermittently due to natural hormone changes. These hormone changes can be due to events such as puberty, childbirth, breastfeeding, or menopause. Temporary irregularities in the menstrual cycle are not always a concern. However, if the irregularities are consistent with no natural cause, patients should consult with their healthcare provider. An irregular menstrual cycle can cause complications such as iron deficiency anemia, infertility, osteoporosis, and cardiovascular disease. Irregular menstrual cycles may be due to hormonal imbalances or other chronic conditions including:

- Hormonal birth control
- Strenuous exercise
- Weight loss
- PCOS
- Endometriosis
- Thyroid disease
- Stress

Irregular menstrual cycles can often be dismissed by healthcare providers as normal. In some cases, irregular menstrual cycles can be temporary and not

concerning. However, it is important to educate patients to always report signs of irregular menstrual cycles to their provider especially if it is not caused by natural hormone fluctuations.

Female Reproductive Hormones

Hormones are chemical messengers that send messages affecting growth and development, metabolism, reproductive organs, and mood. Reproductive hormones include estrogen, testosterone, follicle stimulating hormone (FSH), luteinizing hormone (LH), and progesterone. Estrogen, progesterone, FSH, and LH help regulate the female reproductive system and testosterone is the primary reproductive hormone for males. The levels of these hormones fluctuate in males and females and affect sexual characteristics and fertility.

Estrogen is an important female reproductive hormone that is made in the ovaries and fluctuates throughout the menstrual cycle. Estrogen levels are increased to stimulate the maturation of eggs and ovulation. If the egg is fertilized, increased estrogen thickens the lining of the uterus to allow implantation of the fertilized egg.

Irregularities in estrogen levels can cause many health issues for females. The most common causes for low levels of estrogen is the onset of menopause or the surgical removal of the ovaries. Symptoms of low levels of estrogen include:

- Absence of or less frequent menstruation
- Hot flashes or night sweats
- Difficulty sleeping
- Vaginal dryness
- Decreased libido

- Mood swings
- Dry skin
- Menstrual migraines

The most common causes for elevated estrogen levels include:

- Obesity
- Stress
- Medications
- PCOS
- Endometriosis
- Insulin resistance
- Genetic conditions

Excess levels of estrogen in females can increase the risk of uterine and breast cancer, blood clots, and cardiovascular disease. Symptoms of excess levels of estrogen include:

- Weight gain especially in waist, hips, and thighs
- Light or heavy bleeding
- Extreme PMS symptoms
- Fibrocystic breasts
- Uterine fibroids
- Fatigue
- Decreased libido

- Depression or anxiety

Imbalances in estrogen are important to address. Patients should be educated to inform their healthcare provider if they are experiencing any symptoms of high or low estrogen. Primary providers are not always knowledgeable on female hormone imbalances so a gynecologist may be a better resource for female patients with hormone irregularities.

Progesterone is a female reproductive hormone that helps prepare the uterine lining for a fertilized egg. Progesterone is secreted by the corpus luteum which is a temporary organ that is produced once per month. The corpus luteum consists of a collection of cells that exists within the ovary once the ovarian follicle has released a mature egg during ovulation. Progesterone signals the thickening of the uterine lining to accept a fertilized egg. If the released egg is not fertilized, the level of progesterone will decrease and trigger menstruation.

Irregularities of progesterone can cause many health issues for females, especially when trying to get pregnant. Progesterone will remain elevated throughout pregnancy in order to help the fetus grow. Low progesterone levels could affect the growth of the fetus and result in a miscarriage. Causes of low progesterone levels include decreased function of the ovaries, but oftentimes the cause is unknown. Symptoms of low levels of progesterone include:

- Abnormal bleeding
- Frequent headaches or migraines
- Irregular or missed menstruation
- Spotting and abdominal pain during pregnancy
- Frequent miscarriages

It is important for patients to understand the adverse effects of decreased

progesterone levels especially if they are pregnant. If pregnant patients are experiencing any symptoms of low progesterone, their healthcare provider may prescribe a progesterone supplement to support the growth of the fetus and prevent miscarriage.

Increased levels of progesterone usually do not have any adverse effects. Increased levels of progesterone are expected when pregnant, and healthcare providers are usually not concerned if progesterone is elevated when not pregnant.

Follicle stimulating hormone (FSH) is the female reproductive hormone produced by the pituitary gland that stimulates follicles in the ovaries to mature into eggs for ovulation. Irregularities of FSH can cause many health issues for females.

Elevated FSH levels usually indicate that there is a problem with the ovaries. High FSH levels can cause ovarian hyperstimulation syndrome which is a painful enlargement of the ovaries due to excess reproductive hormones. Ovarian hyperstimulation syndrome often occurs when females are undergoing treatment for infertility through in vitro fertilization (IVF). IVF involves the injection of hormone medications to stimulate the development of eggs and ovulation. A side effect of these medications is ovarian hyperstimulation syndrome.

Low FSH levels usually indicate delayed puberty in adolescents or that there is an issue with the pituitary gland. Symptoms are often similar for both high and low levels of FSH and include:

- Delayed puberty in adolescents
- Decreased libido
- Fatigue
- Infertility

- Hot flashes
- Lack of or irregular menstruation
- Loss of pubic hair

Luteinizing hormone (LH) is the female reproductive hormone produced by the pituitary gland that stimulates the ovaries to release an egg during ovulation and promotes the production of progesterone. Irregularities of LH can cause many health issues for females. PCOS can cause elevated LH levels. Some genetic conditions, such as Turner syndrome, Fragile X, and Klinefelter syndrome can also cause elevated LH levels. Decreased LH levels can indicate that there is an issue with the pituitary gland. Symptoms of both high and low levels of LH are similar to symptoms of abnormal FSH levels.

Testosterone is the main reproductive hormone in males, but is also present in females. Females typically have a very low amount of testosterone, so elevated testosterone levels can cause health issues. High levels of testosterone in females is commonly caused by PCOS. Symptoms of high testosterone in females include:

- Excess body and facial hair
- Acne
- Irregular menstrual cycles

Understanding the female reproductive system and how the menstrual cycle works is key to understanding conditions such as adnexal masses and PCOS that affect the female reproductive system. Many females do not know how their own bodies regulate reproductive hormones or why they experience different symptoms at different points in their menstrual cycle. Empowering patients to understand how their body works is important to helping them recognize when something is wrong.

Section 2 Personal Reflection

How can understanding the menstrual cycle and the effects of female reproductive hormones help patients understand and advocate for their own reproductive health?

Section 2 Key Words

Vagina - The part of the female reproductive system that joins the cervix to the outside of the body.

Cervix - The lowest part of the uterus that expands to allow the birth of a baby during delivery.

Uterus - The female reproductive organ that expands to hold a fetus during pregnancy.

Ovaries - Two small glands located on either side of the uterus that produce eggs and female reproductive hormones.

Fallopian tubes - Two narrow tubes attached to the uterus that allow the egg to travel from the ovaries to the uterus.

Menstrual cycle - The complex cycle controlled by female reproductive hormones to prepare the body for pregnancy.

Menses - The phase in the menstrual cycle when menstruation occurs if the egg is not fertilized.

Menstruation - The process during the menstrual cycle of shedding the uterine lining if the egg is not fertilized, also known as a “period”.

Follicular phase - The phase in the menstrual cycle when estrogen increases to trigger the thickening of the uterine lining and follicle stimulating hormone

increases to promote follicle growth in the ovaries.

Follicle stimulating hormone (FSH) - A female reproductive hormone that triggers the development of follicles in ovaries to mature into eggs.

Ovulation - The phase of the menstrual cycle where an egg is released from the ovaries for fertilization.

Luteinizing hormone (LH) - The reproductive hormone that stimulates the ovaries to release an egg.

Luteal phase - The phase in the menstrual cycle where the egg travels from the ovaries to the uterus and is implanted if it is fertilized.

Menopause - The natural ceasing of menstruation, typically occurring in females around 50 years of age.

Premenstrual syndrome (PMS) - Physical and emotional symptoms that occur right before menstruation due to the fluctuating levels of reproductive hormones.

Hormones - Chemical messengers that send messages throughout the body affecting growth and development, metabolism, reproductive organs, and mood.

Estrogen - A female reproductive hormone responsible for stimulating the maturation of eggs and ovulation.

Menstrual migraines - Headaches occurring before or during menstruation due to the decrease in estrogen, also known as “hormone headaches”.

Progesterone - A female reproductive hormone that stimulates the uterus to prepare for pregnancy.

Ovarian hyperstimulation syndrome - A condition that occurs in response to excess reproductive hormones and causes painful enlargement of the ovaries.

Testosterone - A male reproductive hormone that stimulates the development of male puberty and sexual characteristics.

Section 3: Adnexal Masses

References: 1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 21, 28

Adnexal masses can cause problems with fertility and have severe lifelong health consequences. In some cases, adnexal masses can be fatal. An adnexal mass is a growth that forms in the female reproductive organs and surrounding tissues and can be benign or malignant. A benign mass is a tumor or growth that is not cancerous and does not spread to other parts of the body. An example of a benign adnexal mass is an ovarian cyst. A cyst is a fluid-filled sac that can form in any part of the body. Most cysts are benign, but some can become malignant in rare cases. Ovarian cysts are common in females of reproductive age and can occur when ovulation does not occur due to irregular hormone levels.

A malignant mass is a tumor or growth that contains cancerous cells that can spread to other parts of the body. An example of a malignant adnexal mass is an ovarian tumor which causes ovarian cancer. Ovarian cancer is one of the most common cancers in females. A tumor is defined as a solid mass of abnormal cells. Most tumors are malignant, but some can be benign.

5 to 10% of females in the United States will develop an adnexal mass at some point in their lives. Most adnexal masses are benign and often do not cause debilitating symptoms. However, it is important that patients are aware of the signs and symptoms of adnexal masses and follow up with their healthcare providers as 15 to 20% of adnexal masses are malignant. Early detection is key in treating malignant adnexal masses so patients should be reporting these symptoms right away for the best possible outcome.

Females can be at higher risk of adnexal masses depending on if they are of reproductive age, pregnant, or postmenopausal. Cysts are most common in females of reproductive age. Other common types of adnexal masses for females of reproductive age include ectopic pregnancy and endometriomas. An ectopic pregnancy occurs when a fertilized egg implants outside of the uterus, typically in the fallopian tubes. An ectopic pregnancy is a medical emergency and can be fatal if not treated right away. Endometriomas are fluid-filled cysts that form when the uterine lining grows in the ovaries. 30% of adnexal masses are malignant in females of reproductive age.

Corpus luteum cysts are the most common adnexal masses for pregnant females. 70% of adnexal masses during pregnancy spontaneously resolve without treatment and only about 2% of adnexal masses in pregnant females are malignant.

Postmenopausal females are at higher risk for malignant adnexal masses. Ovarian cancer is relatively rare before 50 years of age. Even though the risk for malignant adnexal masses is higher, most adnexal masses in postmenopausal females are benign masses. It is important that postmenopausal females are aware of the symptoms of ovarian cancer and follow up with their healthcare provider if they are experiencing any symptoms.

Causes of adnexal masses can be gynecologic or non-gynecologic. Non-gynecologic causes typically occur from cancers in other parts of the body, such as breast cancer and colon cancer, spreading to reproductive areas. Gynecologic causes include:

- Ovarian cysts
- Ovarian cancer
- Ectopic pregnancy

- Hydrosalpinx

Risk Factors

Many times, the cause of adnexal masses are unknown, but there are several risk factors linked to adnexal masses including:

- Menopausal age
- Family history of ovarian, colon, or breast cancer
- History of breast-ovarian cancer syndrome
- History of Lynch syndrome

Breast-ovarian cancer syndrome is a genetic condition that increases the risk of breast and ovarian cancer. Lynch syndrome is a genetic condition that increases the risk of colorectal cancer and is also referred to as hereditary nonpolyposis colorectal cancer syndrome (HNPCC). Patients can seek genetic counseling to test for gene mutations that can put patients at greater risk for malignant adnexal masses.

Another common adnexal mass found in females is ovarian cancer. Ovarian cancer makes up a small percentage of all cancer diagnoses, but it has a high mortality rate. It is one of the most common cancers in females. Risk factors for ovarian cancer include:

- Early occurrence of puberty
- Late occurrence of menopause
- Endometriosis
- Infertility

- Family history of ovarian cancer
- History of breast ovarian cancer syndrome
- History of HNPCC or Lynch syndrome

10 to 12% of females diagnosed with ovarian cancer have a family history. Family history of ovarian or breast cancer is considered the biggest risk factor for ovarian cancer. It is important that patients with any of these risk factors are aware of the signs of ovarian cancer and have regular appointments with their healthcare providers. There is currently no recommended preventative screening for ovarian cancer, so early detection of symptoms is extremely important.

Signs and Symptoms

Many symptoms of adnexal masses are nonspecific or asymptomatic and some females may not even know that they have an adnexal mass. Many times adnexal masses are found during a pelvic exam, ultrasound, or during surgery due to the lack of symptoms. Because many benign adnexal masses are asymptomatic, patients showing symptoms of adnexal masses are at a higher risk for malignancy. Many times, cysts appear asymptomatic and resolve on their own without the patient even knowing. When symptoms are present in adnexal masses they can include:

- Pelvic or abdominal pain
- Dysuria
- Irregular menstruation
- Bloating and constipation
- Abnormal bleeding

- Pain during sex

Patients may have additional symptoms if they have a malignant ovarian tumor. It is important that patients notify their healthcare provider immediately if they have any symptoms including:

- Symptoms mirroring irritable bowel syndrome
- Gastrointestinal symptoms such as bloating and constipation
- Fatigue
- Unexplained weight loss
- Pelvic or abdominal pain
- Abnormal bleeding
- Abnormal vaginal discharge
- Frequent urination

These symptoms typically appear suddenly and remain persistent over time. The cause of nonspecific symptoms can be difficult to diagnose so it is important that patients report these symptoms right away and continue to follow up with their healthcare provider if the symptoms persist.

Diagnostic Criteria

Because many adnexal masses are asymptomatic and there is no routine testing, many go undiagnosed. Patients are not usually diagnosed with an adnexal mass until they have continued reported symptoms. The nonspecific symptoms of adnexal masses can also make it difficult to diagnose. Many times, symptoms of adnexal masses may be attributed to other conditions such as PMS or

gastrointestinal issues.

Most adnexal masses are found during routine exams such as pelvic exams and ultrasounds. A primary cause of infertility and irregular menstruation can be adnexal masses. Healthcare providers may perform a pelvic exam and ultrasound if a patient is having irregular menstruation or trouble getting pregnant.

An ultrasound can detect a mass, but it cannot determine if a mass is benign or malignant. Additional labs and imaging may be done to determine the exact cause and type of mass. If the mass is in the ovaries, a transvaginal ultrasound can help assess the size, location, and composition of the mass. A transvaginal ultrasound allows detailed imaging of the female reproductive organs by placing a probe inside the vagina. A pregnancy test and ultrasound can rule out an ectopic pregnancy. Pap smears are routine testing for females of reproductive age, but can only detect abnormal cells in the cervix. A pap smear is a reliable preventative screening for cervical cancer, but not ovarian cancer as it only detects abnormal cells in the cervix. There is no current recommended preventative screening for ovarian cancer.

Benign adnexal masses can be diagnosed with an ultrasound and blood testing. Criteria indicating a benign mass includes:

- Premenopausal age
- No family history of ovarian, colon, or breast cancer
- No symptoms or physical findings
- Ultrasound findings of a mass less than 10 centimeters thickness
- Normal tumor markers

Malignant adnexal masses can be difficult to diagnose early on. 75% of patients with ovarian cancer are not diagnosed until late stage due to the lack of

symptoms or nonspecific symptoms. Concerning diagnostic criteria for a malignant mass includes:

- Known risk factors such as menopausal age and family history
- Persistent symptoms related to malignant ovarian tumors
- Evidence of a large, fixed, irregular mass
- Evidence of ascites
- Ultrasound findings of a mass greater than 10 centimeters thickness
- Elevated tumor markers

Elevated tumor markers are an important part of diagnosing malignant tumors and can be completed through serum testing. Tumor markers such as CA125 are elevated in 80% of malignant ovarian tumors. CA125 is a protein found on cancer cells that can be detected through serum testing. CA125 can also be elevated in patients with endometriosis, pelvic inflammatory disease, and inflammatory bowel disease so it is not a definitive diagnosis for malignancy. However, elevated tumor markers along with the evidence of a mass and corresponding symptoms can be used to diagnose ovarian cancer. Other markers such as alpha-fetoprotein (AFP), human chorionic gonadotropin (HCG), and lactic dehydrogenase (LDH) can also be elevated with certain tumors.

Once a patient has been diagnosed with cancer, the tumor must be staged to determine the prognosis and best course of treatment. Staging is the process of determining how far the cancer has spread from its point of origin to other parts of the body. Staging ranges from stage I to stage IV. Stage IV is the most advanced form of cancer. A biopsy is often performed to run tests to determine staging. A biopsy is a procedure where a small piece of the tumor is removed and sent to a lab for testing. This sample can help determine the exact type and stage of cancer.

Staging is determined based on several criteria:

- Determining the extent of the tumor and if the cancer has spread outside its point of origin
- Determining if the cancer has spread to nearby lymph nodes
- Determining if the cancer has spread to distant areas of the body

For example, the following stages are used to determine the advancement of ovarian cancer:

- Stage I: The tumor is found in one or both ovaries
- Stage II: The tumor is found in one or both ovaries and has spread to other areas of the pelvis
- Stage III: The tumor is found in one or both ovaries and has spread to areas outside the pelvis or lymph nodes
- Stage IV: The tumor is found in one or both ovaries and has spread to distant areas of the body

Stage I has the best prognosis, but ovarian cancer is often not detected until the later stages when the prognosis is much worse. It is imperative that nurses educate their female patients to not ignore symptoms, even if they are nonspecific and do not seem connected to ovarian cancer.

Section 3 Personal Reflection

What might be some reasons that female patients ignore symptoms and risk factors of adnexal masses or delay seeking healthcare if they are experiencing nonspecific symptoms?

Section 3 Key Words

Adnexal mass - A benign or malignant growth that develops around the uterus, ovaries, fallopian tubes, or surrounding tissue.

Benign - A tumor or growth that is not cancerous and does not spread to other parts of the body.

Malignant - A tumor or growth that contains cancerous cells that can spread to other parts of the body.

Cyst - A fluid-filled sac that can form in any part of the body and can be either benign or malignant.

Ovarian cyst - A fluid-filled mass formed on the ovaries that is usually benign, asymptomatic, and resolves on its own.

Tumor - A solid mass of abnormal cells that can be either benign or malignant.

Ectopic pregnancy - When a fertilized egg implants in the fallopian tubes instead of the uterus and can cause serious health consequences.

Endometrioma - A fluid-filled cyst that forms when the uterine lining grows in the ovaries.

Hydrosalpinx - A condition where the fallopian tubes fill with fluid and can cause pain and infertility.

Breast-ovarian cancer syndrome - A genetic condition that increases the risk of breast and ovarian cancer.

Lynch syndrome - A genetic condition that increases the risk of colorectal cancer and is also referred to as hereditary nonpolyposis colorectal cancer syndrome (HNPCC).

Endometriosis - A condition where the tissue from the uterine lining grows elsewhere in the body.

CA125 tumor marker - A protein found on cancer cells that can be detected through serum testing and is elevated in malignant tumors.

Staging - The process of determining how far cancer has spread from its point of origin to other parts of the body.

Biopsy - A procedure where a small piece of the tumor is removed to be sent to a lab for testing.

Section 4: Treatment Options for Adnexal Masses

References: 1, 2, 3, 4, 8, 12, 20, 21

Treatment options for adnexal masses can vary from just surveillance to intense chemotherapy and surgery. Treatment is dependent on the type of mass, prognosis, and the correlating symptoms. Many benign adnexal masses can resolve on their own without treatment while malignant masses require intense and prolonged treatment. There are currently no known prevention strategies for adnexal masses, but early detection can help reduce the risk of further complications.

Treatment for benign masses

Many benign adnexal masses do not need any treatment if they are not causing symptoms. Ovarian cysts are usually 1 to 3 centimeters and can resolve within a few months with minimal symptoms. It is important to continue to monitor the masses to ensure they do not grow and multiply, but they usually resolve on their own. Healthcare providers may recommend monthly ultrasounds to monitor the

cysts. Sometimes ovarian cysts can be as big as 15 to 30 centimeters. If benign masses are causing uncomfortable symptoms, medication and surgical intervention may be recommended. Non-steroidal anti-inflammatory drugs (NSAIDS) can be recommended for pain. Sometimes ovarian cysts can rupture and cause pain and bleeding that may need surgical intervention.

Ovarian torsion can be a serious complication resulting from ovarian cysts. Ovarian torsion occurs when the ovaries twist around surrounding tissue and can cut off blood supply to the ovaries. Ovarian torsion usually occurs in the presence of larger cysts and requires immediate medical attention. Surgery may be required to resolve blood supply to the ovaries and prevent permanent organ damage.

Surgical resection of benign cysts is recommended if they are causing uncomfortable symptoms. Surgical procedures for adnexal masses are focused on relieving symptoms while preserving the reproductive organs and fertility. Healthcare providers often recommend laparoscopic surgery where a surgical instrument can be inserted into the abdomen through a small incision. Laparoscopic surgery is preferred due to the shorter hospital stay, decreased pain, and lower risk of adverse events. The surgeon can view the cysts and surrounding area and remove the cysts if necessary. Surgical resection does not mean that new cysts will not reoccur.

In very rare occurrences, surgical removal of the ovaries may be recommended. Removal of one or both ovaries may be the only treatment option for painful recurring cysts if all other options have failed. Removing the ovaries can have major adverse effects due to the immediate onset of menopause and infertility. Patients should be aware of the permanent effects of this treatment option.

Hormonal birth control can also be used to treat benign cysts. Hormonal birth control can help balance the amount of hormones in the ovaries and prevent new

cysts from forming. However, hormonal birth control does not have any effect on existing cysts. Hormonal birth control can also help with some symptoms of ovarian cysts such as PMS symptoms and irregular menstrual cycles. Overall, benign masses generally have a good prognosis and can have little impact on quality of life and fertility.

Treatment for malignant masses

Patients diagnosed with malignant adnexal masses will be referred to a gynecologic oncologist who specializes in treating cancers of the female reproductive system. It is important to seek out these specialists as they are the experts on the best and most current treatment options. Research shows that patients treated by a specialist have better outcomes than patients treated by a primary provider. Cancer treatment is very individualized so patients should seek a provider that they trust and who involves the patient in the treatment plan. Treatment of malignant adnexal masses usually involves a combination of surgery and chemotherapy and will depend on the type of cancer and staging. Because malignant adnexal masses are usually diagnosed at advanced stages, treatment must be prompt and aggressive.

Chemotherapy involves using intravenous or oral medications to shrink or kill the malignant cells. Sometimes chemotherapy may be recommended prior to surgery to shrink the tumor to make it operable. Chemotherapy may also be recommended after surgery to ensure that all cancerous cells are eliminated. Chemotherapy has many adverse effects and is individualized to the patient and type of cancer. Adverse effects of chemotherapy include:

- Hair loss
- Nausea, vomiting, and diarrhea

- Immunosuppression
- Lack of appetite
- Fatigue
- Neuropathy
- Infertility

Chemotherapy kills cancer cells but also kills any cells around it which can cause many adverse side effects. Patients should be educated about these side effects and their effects on the patient's quality of life. Targeted therapy can be an alternative to chemotherapy as medications are used to identify and kill specific cancer cells. Targeted therapy can help avoid some of the serious side effects of chemotherapy. Targeted therapy can use antibodies to target the cancer cells and not affect the healthy surrounding cells, thereby eliminating many of the side effects of chemotherapy. Antibodies are proteins that attach to the cancer cells and can kill the cells or block them from growing. Clinical studies continue to explore the possibilities of targeted therapy and new medications used to effectively treat different cancers while also minimizing serious side effects.

Surgical resection of the malignant tumor may be enough to treat if the tumor is found at an early stage and is deemed safe to operate. Sometimes, surgical resection of malignant tumors is not recommended as initial treatment due to the risk of the cancerous cells spreading to other areas. Surgery can be considered an aggressive treatment as sometimes a complete hysterectomy or oophorectomy is needed. A hysterectomy is the surgical removal of the uterus, and an oophorectomy is the surgical removal of the ovaries. A hysterectomy or oophorectomy can have permanent effects on the female reproductive system so is considered an advanced form of treatment. These surgeries can lead to permanent hormone imbalances, menopause, and infertility so it is important

that patients are aware of the risks. However, sometimes these surgeries may be the only option for the patient if the cancer is in an advanced stage.

Patients should also be aware that malignant masses can recur even after treatment has been deemed successful. A recurrent mass may require more rounds of chemotherapy and more surgery. Healthcare providers may recommend more invasive and aggressive treatment options than previously. Patients may also choose to cease treatment if the cancer is very aggressive and all options have been exhausted. Many times patients grow weary of the intense side effects of chemotherapy and the physical and emotional toll of treatment. Healthcare providers must support patients in every stage of treatment for malignant masses.

Section 4 Personal Reflection

What impact could treatment for a malignant adnexal mass have on a patient's quality of life? What life changes may they encounter during their treatment?

Section 4 Key Words

Ovarian torsion - A serious complication from ovarian cysts that occurs when the ovaries twist around surrounding tissue and can cut off blood supply.

Surgical resection - A type of surgery that removes part or all of a mass, tissue, or organ and is often used to remove a mass or tumor.

Laparoscopic surgery - A surgical procedure where a surgical instrument is inserted through a small incision in the abdomen.

Chemotherapy - The use of intravenous or oral medications to shrink or kill malignant cells and is individualized to the patient and type of cancer.

Targeted therapy - The use of certain medications such as antibodies to identify and kill specific cancer cells.

Hysterectomy - The surgical removal of the uterus.

Oophorectomy - The surgical removal of one or both of the ovaries.

Section 5: Polycystic Ovary Syndrome

References: 5, 6, 7, 22, 23, 24, 25, 30

Polycystic ovary syndrome (PCOS) is the most common hormone disorder for females and one of the most common causes of infertility. 5 to 10% of females of reproductive age suffer from PCOS and it is estimated that 5 to 6 million females in the United States are diagnosed with PCOS. PCOS is a hormonal condition where the ovaries produce abnormal levels of reproductive hormones that can cause ovarian cysts, infertility, and other adverse symptoms. PCOS primarily affects the ovaries and reproductive system and can have lifelong health consequences.

Risk Factors

There are many risk factors that can be related to PCOS. Oftentimes the cause of PCOS is unknown, but research has shown that PCOS can have genetic connections. Females who have a family history of PCOS are at a higher risk of also being diagnosed with PCOS. Other risk factors of PCOS include:

- Insulin resistance
- Obesity
- Irregular menstrual cycle

- Pituitary gland abnormality

Insulin resistance is closely related to PCOS. Insulin resistance is a condition when cells do not respond to the effects of insulin, which is a hormone that lowers the level of glucose in the blood. Insulin resistance can lead to elevated glucose levels which can cause adverse health effects and lead to type 2 diabetes and cardiovascular disease. Obesity can increase insulin resistance and cause PCOS symptoms to worsen. Obesity can also increase the risk of other chronic conditions related to PCOS such as cardiovascular disease, stroke, and sleep apnea. Not all patients with PCOS are obese, but 40 to 80% of patients with PCOS are obese. Patients with PCOS have been shown to have a slower metabolism which can contribute to weight gain. The exact relationship between obesity and PCOS is unknown. According to some research, obesity can be a cause of PCOS while other research shows that PCOS can contribute to weight gain. Healthcare providers agree that either way, weight loss plays a role in the management of PCOS and related chronic conditions. If a patient with PCOS is obese, weight loss must be part of their treatment plan.

PCOS is also related to elevated androgen levels. Androgens are the group of male reproductive hormones that normally appear in very low levels in females. Testosterone is the dominant type of androgen and is elevated in 60 to 80% of patients with PCOS. Insulin resistance can also increase androgen levels in females. Androgens are produced in the ovaries which can be very sensitive to changes in insulin. When insulin is not regulated appropriately due to factors such as insulin resistance, the ovaries can be affected. This can cause an excess of androgens and contribute to PCOS.

It is important to understand that PCOS is related to many chronic health conditions. Patients diagnosed with PCOS are at higher risk of many chronic health conditions including:

- Infertility
- Type 2 diabetes
- Gestational diabetes
- Sleep apnea
- Cardiovascular disease
- Stroke
- Hypertension
- High cholesterol
- Uterine cancer
- Metabolic disorders
- Mental health issues such as depression and anxiety
- Fatty liver disease

Infertility is closely related to PCOS. 70% of females with PCOS have problems with ovulation and getting pregnant. Many times, patients are not diagnosed with PCOS until they are struggling with infertility. Insulin resistance and increased androgen levels can contribute to ovarian dysfunction, causing a lack of ovulation and fertility issues. In many cases, infertility is the biggest disrupter for patients with PCOS. The physical symptoms of PCOS can be mild and not impactful on daily life, but struggling with infertility can be a big emotional toll on patients. Patients may choose more invasive treatment options if they are wanting children but cannot get pregnant. Patients with PCOS can also be at a higher risk of uterine cancer. Irregular menstrual cycles and the lack of ovulation can lead to abnormal thickening of the uterine lining which can be a cause of uterine cancer.

Type 2 diabetes and gestational diabetes are also related to PCOS. Research shows that more than half of patients with PCOS are diagnosed with type 2 diabetes before the age of 40. Type 2 diabetes is a chronic disease that occurs when blood glucose levels are consistently elevated due to insulin resistance or the lack of insulin production. Gestational diabetes is a condition where blood glucose levels are elevated during pregnancy and usually normalize after birth. The relationship between PCOS and insulin resistance makes patients with PCOS at high risk for type 2 diabetes and gestational diabetes. It is important that patients are aware of this risk and take preventative measures.

Conditions related to PCOS such as hypertension, insulin resistance and obesity can also put patients at higher risk of chronic conditions such as cardiovascular disease, high cholesterol, sleep apnea, and fatty liver disease. PCOS can cause fat accumulation in the liver which can lead to fatty liver disease and chronic liver damage. The risk of cardiovascular disease increases with age and certain factors related to PCOS. A patient who has PCOS and has hypertension and obesity may be more at risk for developing cardiovascular disease than a patient who has PCOS and does not have these other comorbidities.

Research has shown that patients with PCOS are at significantly higher risks of mental health conditions such as depression and anxiety. The exact relationship between PCOS and depression and anxiety is unknown. According to some studies, 25 to 50% of patients with PCOS experience depression and 20% of patients with PCOS experience anxiety. Patients with insulin resistance have been shown to have an increased risk of depression which could contribute to the risk related to PCOS. Stress is a major risk factor for anxiety and depression and many patients with PCOS report chronic stress. Chronic increased stress can impact hormone levels which may already be abnormal with PCOS. Body image related side effects of PCOS, such as acne, hirsutism, and obesity, can also cause mental health conditions. Patients may report depression and anxiety related to negative

body image and low self-esteem. Infertility can also contribute to depression and anxiety. Patients who are struggling to get pregnant may fall into a depression and have feelings of hopelessness and stress. Healthcare providers should always screen for mental health conditions when treating patients with PCOS.

Signs and Symptoms

Signs and symptoms of PCOS can be nonspecific or asymptomatic. Many times, patients may not even be aware that they have PCOS. Early signs of PCOS are often related to increased androgen levels, the most common symptom being hirsutism. Hirsutism is excessive facial and body hair growth on the upper lip, chin, abdomen, chest, or back. Hirsutism in children is usually a sign of early puberty. Hirsutism does not cause any physical adverse effects but can cause psychological adverse effects such as negative body image, decrease self-esteem, and stress. Hirsutism can be caused by other conditions but is very common in females with PCOS.

Another early symptom of PCOS is irregular menstrual cycles. In adolescents, PCOS symptoms often appear as normal changes due to puberty. Irregular menstrual cycles, acne, and weight gain can all be signs of normal hormonal changes such as puberty. Because of the nonspecific symptoms, PCOS diagnosis is often delayed in adolescents. Other symptoms of PCOS include:

- Lack of menstruation
- Abnormally light bleeding
- Lack of ovulation
- Acne
- Excessively oily skin

- Enlarged ovaries
- Polycystic ovaries
- Weight gain especially around the abdomen
- Infertility
- Skin tags
- Dark patches of skin usually on the back of the neck, underarms, or under breasts

Polycystic ovaries are common with PCOS, but not a definitive symptom. Multiple cysts in the ovaries are not always present in PCOS. Irregular menstrual cycles can also be caused by many different conditions. In order to diagnose PCOS, patients must have multiple symptoms based on certain criteria.

Diagnostic Criteria

There is no definitive test to diagnose PCOS. Recent research on PCOS has allowed healthcare providers to diagnose PCOS earlier. Due to the nonspecific symptoms, a PCOS diagnosis can be delayed with patients feeling dismissed by their healthcare providers. Females have not always been included in healthcare research and conditions affecting the female reproductive system are still being explored. It is important for patients to establish a trusting relationship with their healthcare provider and see a specialist if they are experiencing any PCOS symptoms. If patients are experiencing symptoms of PCOS, their healthcare provider may recommend diagnostic criteria including:

- Health history
- Physical exam

- Pelvic exam
- Ultrasound
- Blood tests to determine hormone levels

A pelvic exam can assess for any masses or other abnormalities. An ultrasound can help determine the size of the ovaries and if there are any cysts present. An ultrasound can also assess if the uterine lining is thicker than expected due to a lack of ovulation. Labs may be ordered to assess cholesterol and triglyceride levels, blood glucose levels, and levels of reproductive hormones, especially testosterone.

In order to diagnose PCOS, patients must present with at least two of the following:

- Irregular menstrual cycles or lack of menses
- Elevated testosterone levels or symptoms of elevated testosterone, such as hirsutism
- Polycystic ovaries

An ultrasound to detect ovarian cysts is not required to diagnose PCOS. If patients meet the criteria of irregular menstrual cycles and elevated testosterone levels, they can be diagnosed without an ultrasound. However, many healthcare providers will still recommend an ultrasound to rule out the presence of cysts.

Section 5 Personal Reflection

What could be some contributions to the fact that many females have a delayed diagnosis of PCOS?

Section 5 Key Words

Polycystic ovary syndrome (PCOS) - A hormonal condition where the ovaries produce abnormal levels of reproductive hormones that can cause ovarian cysts, infertility, and other adverse symptoms.

Androgens - The group of male reproductive hormones including testosterone that are responsible for male sex characteristics and fertility.

Insulin resistance - A condition when cells do not respond to the effects of insulin which can lead to high glucose levels.

Insulin - A hormone that lowers the level of glucose in the blood.

Type 2 diabetes - A chronic disease that occurs when blood glucose levels are elevated due to insulin resistance or the lack of insulin production.

Gestational diabetes - A condition where blood glucose levels are elevated during pregnancy and usually normalize after birth.

Hirsutism - The presence of excessive facial and body hair growth.

Skin tags - Small pieces of extra skin usually on the neck or underarms.

Section 6: Treatment Options for PCOS

References: 5, 6, 7, 13, 14, 25, 26, 29, 31

Treatment for PCOS is focused on symptom management. PCOS has lifelong health implications so early treatment is key in preventing further complications. There is no cure for PCOS, but many treatment options can be effective in managing symptoms so patients can have a great quality of life. A big part of treatment for PCOS is promoting ovulation especially in patients who desire to have children. Maintaining a healthy weight is another big part of treatment for

PCOS. A healthy weight can help decrease insulin resistance, manage symptoms, and improve ovulation. Research shows that reducing even 5% of weight in patients who are overweight can help regulate their menstrual cycle and improve ovulation. Sometimes losing weight is the only treatment patients need in managing PCOS symptoms and improving their menstrual cycle. Treatment for PCOS needs to be individualized and may look different for each patient. Overall, maintaining a healthy lifestyle is the key for PCOS management.

Activity and Exercise

There are many non-pharmacological treatment options for PCOS. Exercise plays a big role in weight management and insulin resistance management. Research has shown that at least 45 minutes of exercise at least three times per week can help regulate insulin. Resistance training is a type of exercise that involves repeated movements against weight to invoke muscle use. An example of resistance training is weight lifting. According to the American College of Sports Medicine and the American Diabetes Association, resistance training is recommended to help prevent and manage many chronic diseases such as type 2 diabetes. Resistance training can provide many benefits for patients with chronic disease including:

- Weight loss
- Improving fertility
- Regulating insulin
- Decreasing blood pressure
- Decreasing testosterone levels
- Improving muscle and bone strength

Because females were not always included in health related research, the impact of resistance training on female hormones is not as well known. However, many recent studies are showing that resistance training can have a big positive impact on female hormones and conditions such as PCOS.

Diet and Nutrition

Diet and nutrition is an important part of PCOS management. A healthy well-rounded diet can help manage weight and improve PCOS symptoms. For patients with PCOS who are obese, research shows that a healthy diet has been shown to be more effective in weight loss than just exercise alone. Nutritional counseling can help patients figure out what type of diet is best for them.

Research has shown that an anti-inflammatory Mediterranean diet can help decrease PCOS symptoms. A Mediterranean diet focuses on a balance of certain types of foods including:

- Avoiding saturated fats such as butter
- Focusing on non-starchy vegetables and fruits such as leafy greens and tomatoes
- Avoiding red meat and processed meats
- Focusing on lean protein such as fish and chicken
- Avoiding processed foods and refined sugar
- Avoiding fried foods
- Focusing on carbohydrates with a low glycemic index
- Limiting alcohol and sugary drinks

- Focusing on omega-3 foods such as fish, olive oil, and legumes
- Focusing on whole grains such as brown rice

Other recommendations include eating small frequent meals to help maintain insulin levels and avoiding fasting. Fasting is not recommended for patients with PCOS as avoiding food for long periods of time can cause unstable insulin levels.

Nutritional supplements can also help decrease PCOS symptoms. Omega-3 fish oils can help reduce cholesterol, liver fat content, and blood glucose levels. Other vitamins and minerals may help with PCOS symptoms, but research is limited. Nutritional supplements are not regulated by the United States Food and Drug Administration (FDA) so formulas and quality can vary. Healthcare providers recommend focusing on a healthy well-balanced diet first and may recommend nutritional supplements if more interventions are needed. More research and regulation is needed to determine the safest supplement options that provide the most benefits for patients with PCOS.

Mental Health

Patients should be aware of the higher risks of anxiety and depression with PCOS. Several different interventions can help patients cope with mental health conditions such as depression and anxiety. Many people benefit from therapy where patients meet with a licensed professional to talk about their thoughts and feelings and develop coping skills. Therapy can be short-term or long-term.

Medications can also be helpful in managing depression and anxiety. Antidepressants and anti-anxiety medications, such as Lexapro, Zoloft, and Xananx, are groups of medications that can help regulate mood and improve symptoms of depression and anxiety. It is important for patients to know that it can take time for antidepressants and anti-anxiety medications to take effect,

sometimes up to 4 weeks. Patients should have follow up appointments with their healthcare provider to discuss how they are feeling and may need doses adjusted or different medication. It is also important for patients to know that they should taper off these medications if they no longer need them. Stopping antidepressants and anti-anxiety medications suddenly can cause symptoms to become more severe. Most healthcare providers recommend a combination of therapy and medication for patients dealing with anxiety and depression.

Pharmacological Treatment

Pharmacological treatment can also help manage PCOS symptoms. There are medications that can help promote ovulation, decrease acne and hair growth, and help regulate menstrual cycles. Pharmacological treatment options for PCOS include hormonal birth control, medications to promote ovulation, diabetes medications, and antiandrogens.

Hormonal birth control is the most common pharmacological treatment for regulating menstrual cycles and can also help lower testosterone levels, reduce acne, and reduce hirsutism. Hormonal birth control can also help prevent new ovarian cysts from forming. Hormonal birth control can only be used as treatment in patients who are not wanting to get pregnant. Hormonal birth control does have some side effects including:

- Weight gain
- Nausea
- Headaches
- Mood changes
- Decreased libido

Side effects of hormonal birth control are very individualized. Some patients find that the side effects are not worth the benefits, but many times hormonal birth control can be a good option to regulate reproductive hormones and manage symptoms.

The most common medication used to promote ovulation is clomiphene, especially in adolescents. Clomiphene helps increase FSH and LH which promotes ovulation and is usually taken for several days during menstruation. Clomiphene is usually recommended as first-line treatment for patients with PCOS who are trying to conceive. Research shows that clomiphene results in a successful pregnancy about 30% of the time, but 20% of these pregnancies result in miscarriage or stillbirth. Clomiphene has several side effects including:

- Ovarian enlargement
- Ovarian hyperstimulation syndrome
- Bloating
- Fatigue
- Hot flashes
- Vision loss

Aromatase inhibitors, such as Letrozole, help turn testosterone into estrogen to promote ovulation. Letrozole can be another option for patients who are trying to get pregnant if clomiphene is not successful. It is important that patients have realistic expectations when prescribed clomiphene if trying to conceive. Clomiphene and Letrozole are not magic pills that will automatically result in a pregnancy. Many times the medications may not result in pregnancy and other options will have to be pursued. Patients can also get their hopes up with a positive pregnancy, but then have it end in a miscarriage. It is important that

healthcare providers are explaining the risks and success rates of these medications.

Metformin is the medication of choice for regulating insulin resistance in patients with PCOS. Metformin is also often used in patients with type 2 diabetes and helps lower glucose production, increase glucose absorption, and lower testosterone levels. It is important for patients with PCOS to be aware that metformin is not recommended in patients who are pregnant and there are some gastrointestinal side effects including nausea and vomiting, diarrhea, and bloating. There is no evidence that metformin helps manage hirsutism, acne, or infertility. Inositol is another medication used for insulin resistance by helping with insulin signaling. Inositol is also known as vitamin B8 and is a dietary supplement that can help regulate insulin resistance, menstrual cycle, and promote ovulation. The effects on regulating PCOS insulin resistance is not as well known as metformin.

Antiandrogens, such as spironolactone, are common medications used to help reduce hirsutism and acne by decreasing the amount of androgens in the body. Side effects of antiandrogens include nausea, bloating, and irregular menstruation. Antiandrogens can be very effective in managing unwanted PCOS symptoms especially acne and hirsutism.

Surgical Interventions

If non-pharmacological interventions and medications do not help manage PCOS symptoms, surgical interventions may be recommended. Surgical interventions are typically not recommended as the benefits often do not outweigh the risks. However, if a patient's symptoms are severe or they are struggling with infertility, surgical intervention may be the only option.

A surgical procedure called ovarian drilling is not a common treatment for PCOS,

but can help regulate reproductive hormones, promote ovulation, and regulate the menstrual cycle. Ovarian drilling has adverse risks and is not alway effective, so it is not often recommended to patients with PCOS. Ovarian drilling involves breaking down part of the ovaries to help stimulate production of reproductive hormones to induce ovulation. This is a laparoscopic procedure with minimal recovery time. A risk of ovarian drilling is the development of scar tissue, so other options are usually recommended before this procedure. Other adverse risks include:

- Bleeding
- Postoperative pain
- Anesthesia related risks
- Breaking down too much of the ovary which can reduce egg production or induce early menopause

Research shows that pregnancy occurs 61% of the time after ovarian drilling, but in most cases the benefits do not outweigh the risks. Surgical resection of ovarian cysts is not often required as the cysts typically can resolve on their own. However, if the cysts are causing uncomfortable symptoms laparoscopic surgical resection can be recommended.

Section 6 Personal Reflection

What are some practices that you can suggest to patients with PCOS in order to live a healthy lifestyle to help minimize symptoms and promote fertility?

Section 6 Key Words

Resistance training - A type of exercise that increases muscle strength by forcing

muscles to work against another force.

Mediterranean diet - A type of diet traditionally found in Mediterranean countries that focuses on whole foods such as fruits, vegetables, whole grains, and lean protein.

Hormonal birth control - A medication that contains a combination of estrogen and progesterone to help prevent pregnancy and regulate reproductive hormones.

Clomiphene - A medication that induces ovulation by mimicking the effects of estrogen.

Aromatase inhibitor - A medication that helps promote estrogen in the body and helps induce ovulation.

Metformin - A medication used in type 2 diabetes that helps lower glucose production and increase glucose absorption and can also lower testosterone levels.

Inositol - A dietary supplement, also known as vitamin B8, that helps regulate insulin levels.

Antiandrogens - A group of medications that counteract the effects of testosterone such as hirsutism and acne.

Ovarian drilling - A surgical procedure that involves breaking down part of the ovaries to stimulate ovulation, but is not recommended as a first-line therapy for PCOS.

Section 7: Case Study #1

A 16-year-old female patient is being seen during their annual visit to their

gynecologist. The patient reports that their menstrual cycle varies from every 30 days to every 50 days. The patient states that they have intense cramping and nausea during their menses that sometimes requires them to miss school. The patient reports that they have been very stressed since starting high school and even more stressed when they have to miss school due to painful menses. The patient states "I am trying to get into a good college, so I have to get good grades. School can be hard, so sometimes I stay up all night to study." The patient's health history includes menstruation starting at age 14, a history of anxiety and depression, and no medication use or surgical history. The patient states "My periods have always been irregular and painful. I do not understand why I do not have a normal period like my friends."

1. What could be a potential cause of the patient's irregular menstrual cycle?
2. What hormones would the nurse anticipate the healthcare provider evaluating to help determine the cause of the patient's irregular menstrual cycle?
3. What education would the nurse provide to the patient about irregular menstrual cycles?

Section 8: Case Study #1 Review

This section will review the case studies that were previously presented in each section. Responses will guide the clinician through a discussion of potential answers as well as encourage reflection.

1. What could be a potential cause of the patient's irregular menstrual cycle?

   Stress can be a cause of irregular menstrual cycles. The patient stated that they have been under constant stress with school, so that can be a cause of

the irregularities. Other causes of irregular menstrual cycles include hormonal birth control use, strenuous exercise, weight loss, conditions such as PCOS, endometriosis, and thyroid disease. Other natural hormone changes such as pregnancy, childbirth, menopause, and puberty can also cause irregular menstrual cycles. Because the patient just started menses recently, those natural hormone fluctuations can be the cause of their irregular menstrual cycles.

2. What hormones would the nurse anticipate the healthcare provider evaluating to help determine the cause of the patient's irregular menstrual cycle?

   Estrogen abnormalities can cause irregular menstrual cycles and severe PMS symptoms such as severe cramping and nausea. Estrogen levels are increased to stimulate the maturation of eggs and ovulation. If the egg is fertilized, increased estrogen thickens the lining of the uterus to allow implantation of the fertilized egg. Excess levels of estrogen in females can increase the risk of uterine and breast cancer, blood clots, and cardiovascular disease.

   Progesterone helps prepare the uterine lining for a fertilized egg. If the released egg is not fertilized, the level of progesterone will decrease and trigger menstruation. Low levels of progesterone can cause irregular menstrual cycles, but effects of progesterone irregularities are mostly seen in females trying to get pregnant.

   Irregularities in follicle stimulating hormone (FSH) and luteinizing hormone (LH) can also cause irregular menstrual cycles. FSH stimulates follicles in the ovaries to mature into eggs for ovulation. LH stimulates the ovaries to release an egg during ovulation and promotes the production of progesterone. PCOS can cause elevated LH levels.

3. What education would the nurse provide to the patient about irregular menstrual cycles?

   The nurse could provide education to the patient about the menstrual cycle and female reproductive hormones especially since they have just started their menstrual cycle. Understanding the four phases of the menstrual cycle (menses, follicular phase, ovulation, and luteal phase) can help the patient understand how the menstrual cycle affects them. The patient should also understand the criteria for an irregular menstrual cycle:

   - Menstruation occurring less than 21 days or more than 35 days apart
   - No menstruation for more than 90 days
   - Bleeding that is considered unusually heavy or light
   - Bleeding for more than 7 days
   - Severe PMS symptoms such as pain, cramping, and nausea
   - Bleeding in between menstruation cycles

   The nurse could educate the patient about causes of irregular menstrual cycles, including stress and natural hormone changes. The nurse can provide strategies for stress reduction and help the patient understand that the natural hormone changes from puberty can be causing their irregular cycles. The nurse should educate the patient to monitor their menstrual cycles and symptoms and to follow up with their gynecologist if they continue to have irregular menstrual cycles. Early detection and treatment for conditions such as PCOS can help patients have the best outcomes throughout their lives.

Section 9: Case Study #2

A 30-year-old female patient comes to the emergency room for severe abdominal pain and heavy vaginal bleeding. The patient reports that the pain and bleeding started two days ago when they started menses but has gotten progressively worse. The patient states “I always have cramps during my period, but they have never been this painful. I am in so much pain that I cannot even walk up my stairs.” The patient’s health history includes irregular menstrual cycles every 40-50 days, no surgical history, and a family history of breast cancer. The patient has not had any previous pregnancies, but states that they have been trying to conceive with their spouse for the past 10 months.

A pelvic exam and ultrasound is performed in the emergency room and a mass approximately 4 centimeters is found in one of the patient’s ovaries.

1. Based on the findings and the patient’s history, what type of adnexal mass would be a most likely diagnosis for this patient?
2. What other diagnostic tests would be expected for this patient?
3. What education can the nurse provide to the patient regarding follow up care and treatment?

Section 10: Case Study #2 Review

This section will review the case studies that were previously presented in each section. Responses will guide the clinician through a discussion of potential answers as well as encourage reflection.

1. Based on the findings and the patient’s history, what type of adnexal mass would be a most likely diagnosis for this patient?

An ovarian cyst is likely for this patient based on their history and current findings. Ovarian cysts are common in females of reproductive age and can occur when ovulation does not occur due to irregular hormone levels. The patient has a family history of breast cancer which is linked to a higher likelihood of adnexal masses. The patient is exhibiting some symptoms of adnexal masses including severe abdominal pain, irregular menstrual cycles, and abnormal bleeding. The mass found on the ultrasound was less than 10 centimeters in size and the patient is of reproductive age which points to a benign mass rather than malignant. However, a malignant tumor cannot be ruled out based on the above information, so further testing is needed to rule out malignancy.

2. What other diagnostic tests would be expected for this patient?

   A transvaginal ultrasound can help assess the size, location, and composition of the mass. A transvaginal ultrasound allows detailed imaging of the female reproductive organs by placing a probe inside the vagina. A pregnancy test can rule out an ectopic pregnancy. Blood testing can also be done to determine if tumor markers such as CA125 are elevated, which could indicate a malignant tumor.

3. What education can the nurse provide to the patient regarding follow up care and treatment?

   Adnexal masses grow in the female reproductive organs and surrounding tissues and can be benign or malignant. A common type of adnexal mass is an ovarian cyst, which usually is benign and can resolve on its own. Ovarian cysts are common in females of reproductive age and can occur when ovulation does not occur due to irregular hormone levels. Adnexal masses can also contribute to infertility due to the lack of ovulation. Many times, the cause of adnexal masses are unknown, but risk factors can include:

- Menopausal age
- Family history of ovarian, colon, or breast cancer
- History of breast-ovarian cancer syndrome
- History of Lynch syndrome

The abdominal pain, heavy bleeding, and irregular menstrual cycles that the patient is experiencing are all symptoms of an adnexal mass. Other symptoms include dysuria, bloating, constipation, and pain during sex. Repeat ultrasounds will be recommended to monitor the cyst and determine if further treatment is needed.

Section 11: Case Study #3

A 20-year-old college student with a history of ovarian cysts is being seen for a follow up appointment to monitor several existing ovarian cysts. The patient has been taking hormonal birth control for the past two years and has had regular menstrual cycles since starting the hormonal birth control. The patient reports having irregular menstrual cycles prior to starting hormonal birth control. The patient had an appointment one month ago where an ultrasound detected two small ovarian cysts. The patient has been asymptomatic but has had ovarian cysts in the past that resolved without treatment.

The current ultrasound shows growth in both ovarian cysts and the patient reports cramping and bloating over the past week. The patient states “I just feel uncomfortable. The pain is not severe, but it’s keeping me from doing things I normally do daily.”

1. What is the initial treatment plan for benign ovarian cysts?
2. What education can the nurse provide to the patient regarding treatment

for their symptoms?

3. What complications could occur from ovarian cysts?

Section 12: Case Study #3 Review

This section will review the case studies that were previously presented in each section. Responses will guide the clinician through a discussion of potential answers as well as encourage reflection.

1. What is the initial treatment plan for benign ovarian cysts?

   Many benign adnexal masses do not need any treatment if they are not causing symptoms. Ovarian cysts can usually resolve within a few months with minimal symptoms. Healthcare providers may recommend monthly ultrasounds to monitor the cysts to monitor for growth and new cysts.

2. What education can the nurse provide to the patient regarding treatment for their symptoms?

   If benign masses are causing uncomfortable symptoms, medication and surgical intervention may be recommended. Non-steroidal anti-inflammatory drugs (NSAIDS) can be recommended for pain. Surgical resection of benign cysts is recommended if the symptoms become severe.

3. What complications could occur from ovarian cysts?

   Sometimes ovarian cysts can rupture and cause pain and bleeding that may need surgical intervention. Ovarian torsion can be a serious complication resulting from ovarian cysts. Ovarian torsion occurs when the ovaries twist around surrounding tissue and can cut off blood supply to the ovaries. Ovarian torsion usually occurs in the presence of larger cysts and requires immediate medical attention. Surgery may be required to resolve blood

supply to the ovaries and prevent permanent organ damage. In very rare occurrences, surgical removal of the ovaries may be recommended. Removal of one or both ovaries may be the only treatment option for painful recurring cysts if all other options have failed. Removing the ovaries can have major adverse effects due to the immediate onset of menopause and infertility.

Section 13: Case Study #4

A 23-year-old patient reports irregular menstrual cycles since they stopped hormonal birth control two years ago. The patient reports that they always had regular menstrual cycles prior to starting hormonal birth control. The patient reports a 20 lb. weight gain over the past year, along with acne and hair growth on their upper lip and chin. The patient has no relevant medical history and no previous surgical history. The patient states "I hate how my body looks now and I just want to get rid of the weight, acne, and hair." The patient states they have started exercising more over the past few months, but have not lost any weight.

1. What is the most likely diagnosis for this patient based on the above findings?
2. What diagnostic testing would the nurse expect for this patient?
3. What other health issues would the nurse expect this patient to be at risk for?

Section 14: Case Study #4 Review

This section will review the case studies that were previously presented in each section. Responses will guide the clinician through a discussion of potential

answers as well as encourage reflection.

1. What is the most likely diagnosis for this patient based on the above findings?

   Polycystic ovary syndrome (PCOS) is a hormonal condition where the ovaries produce abnormal levels of reproductive hormones that can cause ovarian cysts, infertility, and other adverse symptoms. Symptoms of PCOS include irregular menstrual cycles, acne, hirsutism (excessive facial and body hair growth), and weight gain. PCOS is a common diagnosis for females of reproductive age.

2. What diagnostic testing would the nurse expect for this patient?

   Diagnostic criteria for PCOS includes a health history, physical exam, pelvic exam, ultrasound, and blood testing. A pelvic exam can assess for any masses or other abnormalities. An ultrasound can help determine the size of the ovaries and if there are any cysts present. An ultrasound can also assess if the uterine lining is thicker than expected due to a lack of ovulation. Labs may be ordered to assess cholesterol and triglyceride levels, blood glucose levels, and levels of reproductive hormones, especially testosterone. In order to diagnose PCOS, patients must present with at least two of the following:

   - Irregular menstrual cycles or lack of menses
   - Elevated testosterone levels or symptoms of elevated testosterone, such as hirsutism
   - Polycystic ovaries

3. What other health issues would the nurse expect this patient to be at risk for?

PCOS can lead to many adverse health conditions including insulin resistance and type 2 diabetes. Obesity can increase insulin resistance and cause PCOS symptoms to worsen. Research shows that more than half of patients with PCOS are diagnosed with type 2 diabetes before the age of 40. PCOS can also lead to infertility, gestational diabetes, sleep apnea, cardiovascular disease, stroke, hypertension, high cholesterol, uterine cancer, metabolic disorders, depression, anxiety, and fatty liver disease. 70% of females with PCOS have problems with ovulation and getting pregnant.

Section 15: Case Study #5

A 30-year-old patient is being seen at the gynecologist for concerns for infertility. The patient states they have been trying to conceive with their partner for the past year without success. The patient reports irregular menstrual cycles since they stopped hormonal birth control last year. The patient reports a 20 lb. weight gain over the past year and acne. The patient has a family history of PCOS and reports one occurrence of an asymptomatic ovarian cyst when they were 18 years old that resolved without treatment.

After further evaluation, the patient is diagnosed with PCOS and is inquiring about treatment options, especially options to help with fertility.

1. What treatment options are available for this patient to assist with fertility?
2. What education would the nurse provide about PCOS treatment?

Section 16: Case Study #5 Review

This section will review the case studies that were previously presented in each

section. Responses will guide the clinician through a discussion of potential answers as well as encourage reflection.

1. What treatment options are available for this patient to assist with fertility?

   A big part of treatment for PCOS is promoting ovulation. The most common medication used to promote ovulation is clomiphene. Clomiphene helps increase FSH and LH which promotes ovulation and is usually taken for several days during menstruation. Research shows that clomiphene results in a successful pregnancy about 30% of the time, but 20% of these pregnancies result in miscarriage or stillbirth. Aromatase inhibitors, such as Letrozole, help turn testosterone into estrogen to promote ovulation. Letrozole can be another option for patients who are trying to get pregnant if clomiphene is not successful. It is important that patients have realistic expectations when prescribed clomiphene if trying to conceive. Clomiphene and Letrozole are not magic pills that will automatically result in a pregnancy. Many times the medications may not result in pregnancy and other options will have to be pursued. Patients can also get their hopes up with a positive pregnancy, but then have it end in a miscarriage. It is important that healthcare providers are explaining the risks and success rates of these medications.

   Ovarian drilling is not typically a first-line treatment for PCOS, but may be recommended if medications to promote ovulation are not effective. A risk of ovarian drilling is the development of scar tissue, so other options are usually recommended before this procedure. In most cases, the benefits do not outweigh the risks.

2. What education would the nurse provide about PCOS treatment?

   Treatment for PCOS is focused on symptom management as there is no

cure for PCOS. Diet and nutrition is an important part of PCOS management. A healthy well-rounded diet can help manage weight and improve PCOS symptoms. For patients with PCOS who are obese, research shows that a healthy diet has been shown to be more effective in weight loss than just exercise alone. Research has shown that an anti-inflammatory Mediterranean diet can help decrease PCOS symptoms. Other recommendations include eating small frequent meals to help maintain insulin levels. Nutritional counseling can help patients figure out what type of diet is best for them. Research has shown that at least 45 minutes of exercise at least three times per week can help regulate insulin resistance. Resistance training can provide many benefits for patients with chronic disease including:

- Weight loss
- Improving fertility
- Regulating insulin
- Decreasing blood pressure
- Decreasing testosterone levels
- Improving muscle and bone strength

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