

Human Physiology
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Hello everyone, welcome to another new class in human physiology. In this class, we will discuss female reproductive health, and we will also cover some of the diseases related to female reproduction. So, let us stick with it. So, what different concepts will be covered in this class? We will discuss, in general, what female reproductive health is like. Then, we will discuss different female reproductive diseases. We will also see what sexually transmitted infections, menstrual disorders, and prevention and a healthy lifestyle are.

So, regarding the introduction, according to the WHO, reproductive health is a state of complete physical, mental, and social well-being, primarily for females. And why it is so important in terms of maintaining female reproductive health is because, first of all, it is needed for maintaining overall well-being. that encompasses the physical, emotional, and social aspects of life. It is also important to have a safe motherhood, which is crucial for the reduction of maternal mortality and morbidity.

It is crucial to have healthy offspring and also to maintain overall quality of life. So, what are the different common female reproductive-related disorders that we will try to touch base on in this lecture? We will discuss different menstrual disorders, for example, amenorrhea, and then we will discuss endometriosis and polycystic ovary syndrome, or PCOS. Then we will discuss uterine fibroids, and we will see what pelvic inflammatory disease is. And very importantly, we will discuss uterine prolapse. We already discussed different sexually transmitted infections, including HPV, HIV, and other bacteria-related STIs during our male reproductive disorders section in the last class.

So, we are not going to discuss all of those again; we just have to remember that those similar conditions of STI can basically be transmitted from male to female or vice versa. And their responses and conditions during those infections are mostly the same, and along with that, the treatment intervention strategies are also mostly the same. Finally, we will discuss different types of female reproductive organ-related cancers, such as ovarian cancer, uterine cancer, cervical cancer, etc. The first one will briefly discuss what is considered a common menstrual disorder. So, basically, as we know, in the case of a 28-day whole menstruation cycle, menstruation happens for a female body for about 7 to 8 days.

Menstruation disorders are serious health concerns for women; they can affect their quality of life and potentially also impact their fertility rates. It is very important to recognize that the menstrual cycle varies from person to person, and it can also significantly deviate due to different underlying conditions, sometimes due to changes in location or seasonal conditions; at times, the menstrual cycle can vary greatly. So, the first condition we will discuss is the premenstrual syndrome, or PMS. And what are the symptoms related to PMS? It has been seen as a wide range of physical, emotional, and behavioral symptoms that occur especially in the luteal phase of the menstrual cycle. So, if you remember the luteal phase, it is mostly characterized by the formation of the corpus luteum, which is very important in terms of releasing the hormone progesterone that basically supports the formation of the endometrium.

So, if PMS occurs, it has been seen that females can experience bloating, breast tenderness, headache, fatigue, irritability, mood swings, and depression. Causes are not fully understood, but they may likely involve different types of hormonal fluctuations, mostly like progesterone and estrogen. There can also be situations where neurotransmitter imbalances can cause PMS, and other psychological factors can also have an impact. Then painful menstruation, or dysmenorrhea, mainly refers to primary dysmenorrhea, and it can also be seen as secondary dysmenorrhea. In cases of primary dysmenorrhea, the causes can include prostaglandin release, which can lead to uterine contractions.

The symptom can include cramping pain in the lower abdomen; often, it starts shortly before the onset of menstruation. So, generally, if there is an abnormal prostaglandin release, it can induce cramping and other types of complications. Treatment can be given in terms of NSAIDs or painkillers that can also reduce prostaglandin production. Heat therapy can also be given apart from that; exercise and hormonal contraceptives can also be prescribed. In cases of secondary dysmenorrhea, the causes can include underlying pelvic conditions such as endometriosis, fibroids, pelvic inflammatory disease, etc.

The symptom can be similar to too much pain with cramping, mostly similar to primary dysmenorrhea, but it can be more severe than that. Treatment can be similar, and along with that, painkillers or hormonal contraceptives, heat therapy can be prescribed. Then we will discuss amenorrhea, which is basically the absence of menstruation. So, this is also like the same as amenorrhea; it can be basically divided into two types: primary amenorrhea and secondary amenorrhea. So, in cases of primary amenorrhea, the causes can include failure of menstruation that can begin by the age of 15 with normal growth and secondary sexual characteristics or by age 13 in the absence of secondary sexual characteristics.

So, basically, what can be seen is that if there is normal growth and secondary sexual characteristics present in cases of the female body, but menstruation has not started by the age of 15, or there is a complete absence of secondary sexual characteristics by the age of 13. So, these situations can be kind of called primary amenorrhea. And while evaluation in terms of physical examination and hormone testing can be done to find out the underlying causes. And of course, hormonal therapy can be prescribed in order to start menstruation. Then there can be secondary amenorrhea; the causes are mostly the absence of menstruation for three or more consecutive cycles in women who previously had regular periods.

So, this is basically similar to when there is a regular menstrual cycle for a woman, and if there is a missed period or menstruation for about 3 to 4 consecutive cycles. The common causes of secondary amenorrhea are mostly related to pregnancies or PCOS; sometimes it can also be due to premature ovarian insufficiency or even a thyroid disorder. Evaluation can be done by a pregnancy test, hormonal testing, thyroid function tests, or prolactin level tests. Then the next condition, which is abnormal uterine bleeding, or AUB. There can be different types of AUB, such as heavy menstrual bleeding, or it can be infrequent bleeding, like oligomenorrhea.

There can be irregular bleeding, postmenopausal bleeding, or intermenstrual bleeding. So, there are these different types of conditions of AUB or abnormal uterine bleeding that can be present in females. The general causes that can be seen for this type of abnormal uterine bleeding are hormonal imbalances, polyp formation, or fibroid formation; apart from that, malignancy or tumor formation can also be a cause. Rarely, bleeding disorders can be seen;

this can be related to genetic disorders. Apart from that, different types of infections may also cause conditions like AUB.

Investigations can be conducted in terms of checking the medical history, physical exam, blood tests, pelvic ultrasound, endometrial biopsy, and all these types of different investigations or analytic techniques can be used to observe and determine the conditions of AUB. There are different treatment options; for example, hormonal therapies can be prescribed, and surgeries or hysterectomies can also be done. Then the next condition we will discuss is endometriosis. So, basically, as you know, after day 14, whenever there is a luteal phase and a corpus luteum that is formed, it secretes progesterone. And this progesterone basically helps in terms of maintaining and growing the endometrium; apart from progesterone, estradiol or estrogen also has a very crucial role.

for the proliferation and maintenance of the endometrium. But in cases of endometriosis, what has been seen is that this endometrial or endometrium-like tissue is formed outside of the uterus. So, you can see that generally it should be formed inside the uterus, but in some cases, it can be seen that abnormal endometrium-like tissues can be formed outside the uterus; it can be formed on the surface of the fallopian tube or maybe on the surface of the or near like the other cervix or other areas. And this formation of abnormal endometrium-like tissues can cause severe pain. So, basically in cases of pathophysiology, different types of theories have been included in order to understand why endometriosis happens.

But mostly, it is like a retrograde type of menstruation; metaplasia or different types of immunological factors or genetic factors can be involved. Symptoms generally associated with chronic pelvic pain, apart from fatigue, include bowel or bladder-related issues and infertility, which can also be associated with endometriosis. Diagnosis can be done via pelvic exam imaging like ultrasound and MRI; apart from that, laparoscopy, which is the gold standard, or biopsy can also be done. In terms of treatment, pain management drugs can be given; apart from that, hormonal therapy can be given, for example, different types of contraceptives, progestins, and gonadotropic releasing hormone agonists; these can be prescribed. Surgery, such as laparoscopic surgery or hysterectomy, can also be done rarely.

Long-term implications can include an increased risk of certain ovarian-related cancers; apart from that, long-term pain can also be associated with endometriosis-related complications. The next disease we discuss is PCOS, which stands for polycystic ovary syndrome, and we also cover it during our hormone or endocrine gland classes. So, in cases of the ovary, you can see if there is formation of a cyst. And these cysts can form like a few numbers to rapidly multiply. So, the formation of the cyst in either of the two ovaries can be termed as PCOS or polycystic ovary.

This is basically related to a hormonal disorder. And PCOS treatment mostly focuses on managing the symptoms, such as irregular periods, infertility, acne, and excessive hair growth, and may also involve lifestyle changes. The main cause of PCOS, as we said, is hormonal imbalances or insulin resistance. The symptoms can include irregular periods, infertility, or excess hair growth. Different types of interventions can be taken; for example, weight management, a healthy diet, and regular exercise.

Apart from the different medications that can also be given, for example, hormonal birth control can be given, and anti-androgen medications can be prescribed; these medications mostly help to reduce the effect of excess male hormones. Insulin-sensitizing medication can

be given; for example, metformin, and ovulation induction medication can be given. Apart from that, other medication depending on the specific symptoms can also be given in order to manage or reduce the problems associated with PCOS. Then the next condition we will discuss is about uterine fibroids. This is mostly like a formation of a common benign tumor or a mostly benign type of tumor.

So, mostly the classifications, as we have seen, can have location-related impacts that can also significantly vary the treatment strategies. So, outside the uterus, it can be seen as subserosal; then intramural, or within the uterine wall, it can be seen; and then submucosal, or it can be seen as protruding into the uterine cavity. Many symptoms can be seen; for example, it may cause abnormal uterine bleeding, such as heavy bleeding or prolonged bleeding. Apart from that, pelvic pain or pelvic pressure, or uterine-related issues can also be seen. Diagnosis can be done by a regular pelvic exam or by different types of imaging techniques, including ultrasound or MRI.

For example, the treatment options can be mostly related to hormonal treatments. For example, gonadotropin-releasing hormone agonists can be given to shrink the fibroids; apart from that, progesterone strains or hormonal contraceptives can also be prescribed. Surgical removal of those fibroids is also another option. The next conditions we will discuss for female reproductive health, which include pelvic inflammatory disease (PID), are mostly related to infections, such as sexually transmitted infections (STIs) or urinary tract infections (UTIs). So, the next condition we will discuss is about pelvic inflammatory disease, or PID.

This condition is mostly related to different types of infections of the female reproductive organs. For example, it is mostly related to sexually transmitted infections or STIs like Chlamydia or Gonorrhea. Apart from the different types of urinary tract infections, for example, UTIs can also cause this type of inflammation. In terms of pathophysiology, infections can be seen in the vagina, cervix, or, like in other parts, for example, the fallopian tubes or the uterus. Symptoms can include lower abdominal pain, fever, abnormal vaginal discharge, painful intercourse, irregular bleeding, or painful urination.

Diagnosis can be done through a regular pelvic exam, such as checking the infection level or identifying different types of infections that can be related to either sexually transmitted infections (STIs) or urinary tract infections (UTIs) or uterine-related infections. For example, apart from ultrasounds, laparoscopy can also be done. So, mostly we have to remember that different types of treatments can be given that are related to either sexually transmitted infections or uterine infections. Mostly these are based on different types of antibiotics and those are to be targeted for related bacterial infections. Prevention can be done in terms of maintaining safe sex, which would prevent the transmission of sexually transmitted infections.

Apart from that, regular checking can also be done. The next condition which we will discuss is the uterine prolapse. So, this is a very common condition, and it has been observed that 50 to 60 percent of women experience it, particularly those over a certain age. So, basically, women over the age of 50, like those aged 50 and older, generally have this type of uterine prolapse condition. So, what has been seen is that the uterus should be in its right place; you can see here this is like the ischial area and the spinal area.

So, over time it can be due to many different factors, but if it has been seen that there is a prolapse or descending condition of the uterus, then the uterine prolapse condition can be detected and classified into different stages. For example, in cases of stage 0, there is no

prolapse; it is perfectly maintained in the cervical cuff area. It has been observed that if there is a slight descent of the uterus, it can be termed as stage 1. If it is near the hymen, it is termed stage 2. If it is halfway past, like hymen, it is termed as stage 3.

And if it is almost more than twice, like halfway or twice the distance from the hymen, it is called stage 4. This is almost like an entire uterus protruding condition. The symptoms can include a feeling of heaviness or pressure, a sensation of something falling out of the uterus, difficulty with urination, bowel movements, painful intercourse, etc. Diagnosis can be made by a regular pelvic exam, and according to the exam, different prolapse stages can also be assessed. Mostly in terms of treatment, there are different types of these Kegels, which are mostly different types of buttons.

This type of button can be placed in order to prevent further uterine prolapse. So, like these types of pressories or Kregels can be pressed. Apart from that, a lot of modern therapies are also available. Like spider silk or a different type of mesh, surgical mesh. This type of biomaterial related to surgical mesh can be developed, and these meshes can also be stitched onto the surfaces of the uterine wall.

So, this mesh will help prevent this uterine prolapse further. Another important advantage of this type of surgical mesh is that the surgical meshes are porous, which allows for the exchange of different types of fluids inside or outside. So, this type of biomaterials-based surgical mesh can be surgically operated. And what are the different types of biomaterials we mentioned, mostly like spider silk? Can be used in terms of preparing this type of biomaterial mesh. Then finally, we will discuss the last condition, which, as we all know, like every other organ, the different female reproductive organs can also have tumor formation; it can be either benign or malignant tumor formation.

So, quickly we will go through it; if it happens in the cervix, it is called cervical cancer. Cervical cancer has mostly been associated with frequent HPV or human papillomavirus infections. In terms of prevention, HPV vaccination can be given. With the Pap smear test or other types of imaging techniques, the conditions or tumor formations can be identified. In terms of treatment depending on the stages of the cancer, either radiation therapy, different types of chemotherapy, or combination therapy can be given.

In terms of modern therapy, immunotherapy, genetic therapy, and cell-based therapies can also be used. Also, lastly, if it is well visible surgically, the tumor masses can also be removed in the early stages, but in cases of malignant stages where metastasis has occurred and spread to different organs, it becomes highly difficult to cure the tumor. In the same way that tumor formation happens in the case of the uterus, it can be called uterine cancer. Mostly, endometrial cancer has been seen, which is the most common, and the risk factors can include obesity, age, lifestyle, and even prolonged observation of PCOS. It has also been noted that women who have been on long-term estrogen therapy also have a high risk of uterine cancer.

The symptoms can start with abnormal bleeding and pelvic pain. Diagnosis can be done through regular exams, endometrial biopsy, or different types of imaging, such as ultrasound or MRI. And treatment in the same way as we said for cervical cancer, also in these cases, surgery, radiation therapy, chemotherapy, or some types of modern therapies like immunotherapy and genetic therapies can be obtained. Finally, we will discuss another tumor condition or cancer condition that can occur in the ovary, which is the most common and aggressive form of cancer in females, called ovarian cancer. Mostly, it has been seen that age,

family history, and different types of genetic mutations, for example, BRCA mutations, can cause ovarian cancer.

Mostly, it has been seen that abdominal bloating, pain, and difficulties in eating can have long-associated symptoms with ovarian cancer. Diagnosis can be done by pelvic exam, ultrasound, different types of imaging techniques, or the CA 125 blood test. So, this is like a kind of biomarker test that can also be done. In terms of treatment, as we said, various sorts of therapies, such as radiation therapy, surgery, chemotherapy, combination therapies, or modern therapies like genetic therapies or cell-based therapies, can also be done. Finally, this is not a disease, but of course, we have to discuss menopause, which is a condition when the menstrual cycle of a female basically stops.

This is mostly the permanent kind of cessation of menstruation that can be seen after the reproductive years, and it has been observed that females aged about 40 to 45 years can experience the condition of menopause. Causes can include natural decline in ovarian function; apart from that, various other disease conditions can also cause early menopause. Symptoms can have irregular periods, hot flashes, night sweats, mood swings, sleeping disturbances, etc. In terms of long-term health risk, it can also have an effect in terms of osteoporosis or cardiovascular health. Finally, do you know that the vaginal microbiome is highly crucial because a healthy balance of the bacteria in the vagina is essential for preventing different types of infections? So, of course, not only our gut but also the vaginal bacteria in females and the female vaginal microbiome.

Related overall population is very crucial because, in cases of any imbalance, there is a high risk of other pathogenic bacteria growing and causing significant infections. In cases of significant bacterial infections, antibiotics can be given, but in modern times, as you all know, they are related to bacteria. Resistance has been a big problem for all the doctors and patients. In cases of drug resistance, there are only very few options, maybe three or four drugs that are present in order to remove those resistant bacteria. So, activity questions: what are the new emerging treatments or interventions for uterine prolapse? Can you tell me? Finally, if you have any further questions, please discuss them with us during the live sessions.

Apart from that, you can send your questions by email. Thank you again for attending today's class on human physiology. Hopefully, you are enjoying your overall human physiology class. We will meet you very soon with another new class. Thank you again.