

King Saud University Medical City  
King Khalid University Hospital  
Department of Obstetrics & Gynecology  
Course GYN 482

# PUBERTY

# Objectives

- ▶ Recognize sexual differentiation
- ▶ Know the role of sex chromosome in sexual differentiation .
- ▶ To know the normal phases of female puberty
- ▶ Recognize the causes of abnormal puberty

# Sexual Differentiation

- ▶ The embryo differentiates into female or male through the sex chromosomes .
- ▶ Sex chromosomes XY is a male and XX is a female.
- ▶ Gonadal sex is the differentiation of either ovaries or testes .
- ▶ Subsequent development of the internal and external genitalia give phenotypic sex .

- ▶ In the presence of Y chromosome the undifferentiated gonad will become a testis .
- ▶ Absence of Y chromosome will result in the development of the ovaries .
- ▶ We need at least one X chromosome for embryo development .
- ▶ The testis produce androgen and mullerian inhibitor

- ▶ The undifferentiated embryo contain both Wolffian and Mullerian ducts .
- ▶ Wolffian duct will develop the male internal organs .
- ▶ Mullerian duct will develop female internal organs .
- ▶ The leydig cell produces testosterone that promotes the development of the Wolffian duct will lead to vas deferens, epididymis and the seminal vesicles

- ▶ Dihydrotestosterone acts on the cloaca to form the penis and the scrotum .
- ▶ Absence of the testosterone means the wolffian duct will regress and the cloaca will be an external female genitalia

# Normal Puberty

- ▶ It happens as the result of the maturation of the hypothalamo pituitary ovarian axis .
- ▶ The gonadotrophin releasing hormones is produced and the gonadotrophin FSH and LH will increase in frequency and amplitude .
- ▶ This will lead to full establishment of the normal ovulatory menstrual cycle .
- ▶ Puberty occurs over a period of 5 to 10 years

# Physiology of Puberty

- ▶ This is result in the physical changes resulting in female adult life in these sequences .
- ▶ Growth spurts .
- ▶ Breast development .
- ▶ Pubic hair growth .
- ▶ Menarche .
- ▶ Finally axillary hair growth .
- ▶ This sequences occurs in 70% of female and variation may happens .



- ▶ Growth spurts starts at the age of 11
- ▶ 6-10 cm per year .
- ▶ By the age of 15 most girl will achieve their final height.
- ▶ Menstrual cycles in the region between 9 and 16 and usually are irregular because of the immaturity of the axis .

# Precocious Puberty

- ▶ Puberty before the age of 9 years .
- ▶ Causes.
- ▶ Idiopathic .
- ▶ McCune Albright syndrome.
- ▶ Tumor of adrenal and ovary producing hormones.
- ▶ Cerebral tumor.
- ▶ Ingestion of exogenous estrogens.

- ▶ The commonest cause is simply is premature maturation of hypothalamus and production of the gonadotropin releasing hormones.
- ▶ This can be treated with gonadotropin releasing hormones agonist GnRHa .
- ▶ But other serious causes should be excluded like brain tumor

# Delayed Puberty

- ▶ Mostly patient come because of delay in the menstruation .
- ▶ It is important to establish whether puberty itself is delayed.
- ▶ Detailed history is taken about other secondary sexual characters.
- ▶ Exclude chronic illness .
- ▶ Family history.

# Investigations

- ▶ Gonadotropins level FSH and LH .
- ▶ Karyotyping .
- ▶ Pelvic ultrasound to confirm the presence of the uterus and ovaries .
- ▶ Possibly X- ray to determine bone age.
- ▶ Other like thyroid function test prolactin and 17-alpha-hydroxy-progesterone .

# Hypogonadotropic hypogonadism

- ▶ Majority is constitutional delay in puberty.
- ▶ May be secondary to chronic illness and improvement of underlying condition is the treatment.
- ▶ Anorexia nervosa at young age have low levels of gonadotrophin .
- ▶ Athletic girls .
- ▶ Congenital deficiency of gonadotropin with hypoplasia of olfactory lobe Kallman syndrome

- ▶ Acquired damage to hypothalamus and pituitary by tumor, trauma ,infection , radiation , secondary to hydrocephalus and hemochromatosis due to repeated transfusion in sickle cell disease , thalassemia and willson disease .
- ▶ In all cases the ultrasound will confirm the immature uterus and small inactive ovaries,

- ▶ Most girls with constitutional delay will proceed to normal development if left untreated.
- ▶ Otherwise treatment is replacement with gonadotropin or estrogen and progesterone .



# Hypergonadotropic hypogonadism

- ▶ Failure of gonadal development.
- ▶ No negative feed back from the gonads .
- ▶ Commonest cause is Turner syndrome 45xo .
- ▶ Damage to the ovaries by infection , irradiation, chemotherapy, or surgery .
- ▶ Autoimmune disease such as Adison , vitiligo, and hypothyroidism.

- ▶ Turner syndrome.
- ▶ Features.
- ▶ Wide carrying angle of the arms .
- ▶ Webbed neck .
- ▶ Broad chest and widely spaced nipples .
- ▶ May have color blindness, co-arctation of the aorta .
- ▶ Streak ovaries and may be a small uterus.

- ▶ Treatment by hormone replacement therapy estrogen and progesterone.
- ▶ Gonadal causes carries a bad prognosis for pregnancy .

- ▶ Anatomical causes ,
- ▶ Normal puberty but no menstrual cycle .
- ▶ Imperforate hymen or transverse vaginal septum.
- ▶ 1-They present with amenorrhea ,cyclical pain and sometime retention of urine .
- ▶ Treat with incision of the hymen or the septum .
- ▶ 2- mullarian agenesis , no uterus ,fallopian tubes and vagina.
- ▶ Exclude urinary tract anomalies.

# Androgen insensitivity syndrome

- ▶ Normal breast but scanty or absent pubic hair.
- ▶ This is due androgen insensitivity syndrome .
- ▶ The karyotype ( genotype) is XY and phenotype is a female .
- ▶ They have testes .
- ▶ There is no uterus, fallopian tubes, and upper two third of the vagina.

- ▶ Management .
- ▶ The patient is brought up as a female .
- ▶ Remove the testes because of the risk of malignant transformation .
- ▶ Start hormonal replacement therapy .
- ▶ Create a vagina for satisfactory sexual intercourse .

- ▶ Abnormal uterine bleeding .
- ▶ Is common after the menarche .
- ▶ Mainly due the un-ovulatory cycles .
- ▶ In case of menorrhagia treat if it is affecting the general condition of the patient .
- ▶ Exclude other blood diseases hemophilia and Vonwillibrand disease .
- ▶ Oligo menorrhea reassure the patient .
- ▶ It is usually improve spontaneously with time .

# Congenital adrenal hyperplasia

## CAH

- ▶ Autosomal recessive .
- ▶ Mainly 21 hydroxylase deficiency
- ▶ Excessive androgen sex hormones .



- ▶ Clinical picture .
- ▶ Ambiguous genitalia.
- ▶ Either delayed or precocious puberty .
- ▶ Excessive facial hair .
- ▶ Virilization clitoromegaly .
- ▶ menstrual disorder .
- ▶ Infertility.

- ▶ Investigations.
- ▶ Hormonal assay .
- ▶ 17-hydroxyprogesterone is high .