AMENORRHEA

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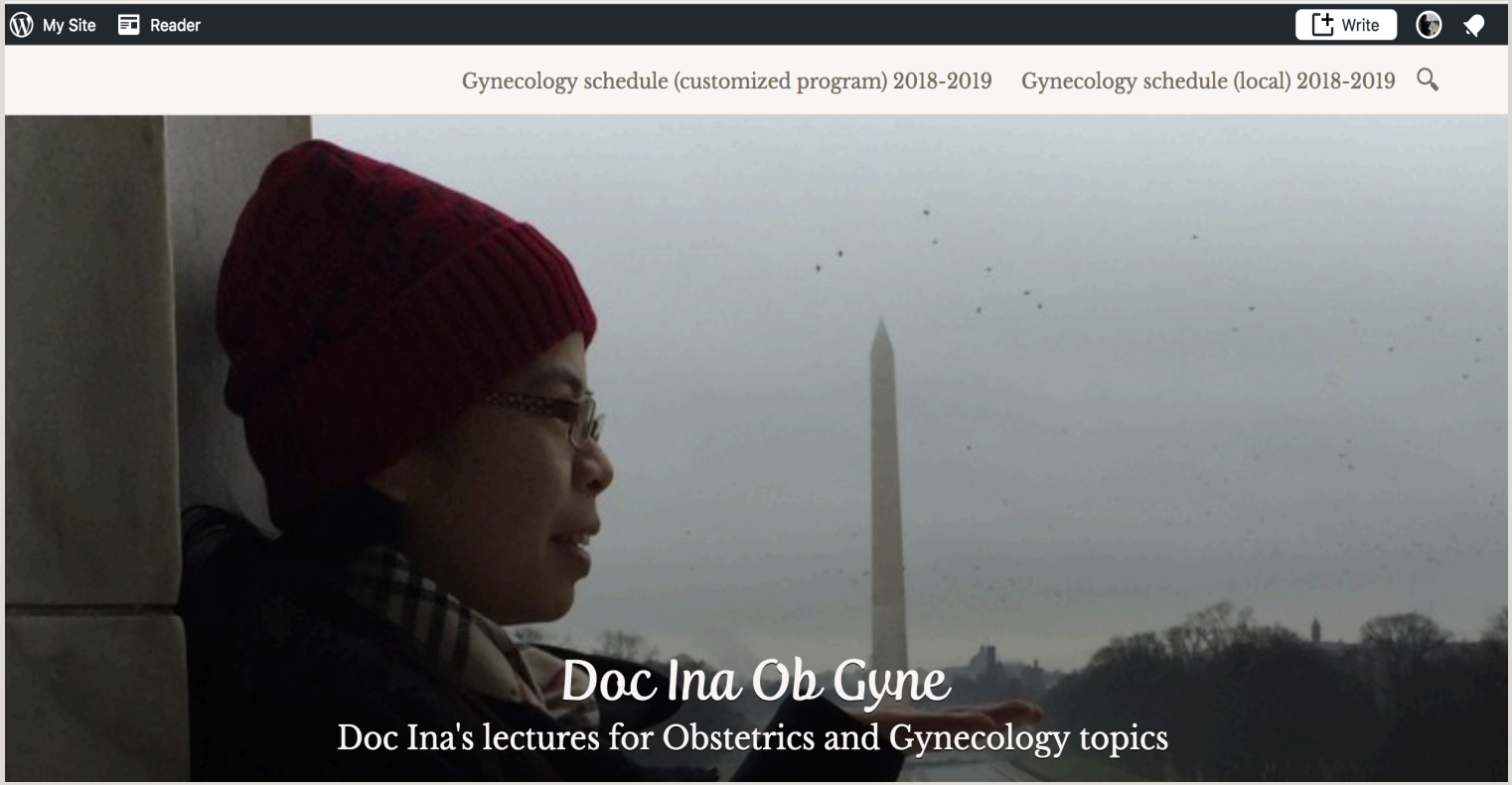

REFERENCES

- Comprehensive Gynecology 7th edition, 2017 (Lobo RA, Gershenson DM, Lentz GM, Valea FA *editors);* chapter 38: Primary and Secondary Amenorrhea; pp 829-852.
- Practice Committee, American Society for Reproductive Medicine, 2008.
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OUTLINE

- 1. Definition of Terms
- 2. Review: Puberty and Tanner Staging
- 3. Primary Amenorhhea: Definition, Classification, Causes, Treatment
- 4. Secondary Amenorrhea: Causes, Treatment

REVIEW:
PUBERTY DEVELOPMENT
TANNER STAGING

PUBERTY

- refers to the physical transitions that occur during adolescence. Adolescents also experience cognitive maturation and psychosocial maturation.
- The most visible changes during puberty are growth in stature and development of secondary sex characteristics.
- Also noted are changes in body composition; achievement of fertility; and changes in most body systems (such as bone, with increased growth and mineralization), brain development, and the cardiovascular system (with greater aerobic power reserve, electrocardiographic changes, and blood pressure changes).

Biro FM, Chan YM. Normal Puberty. www.uptodate.com. 2020

TANNER STAGING

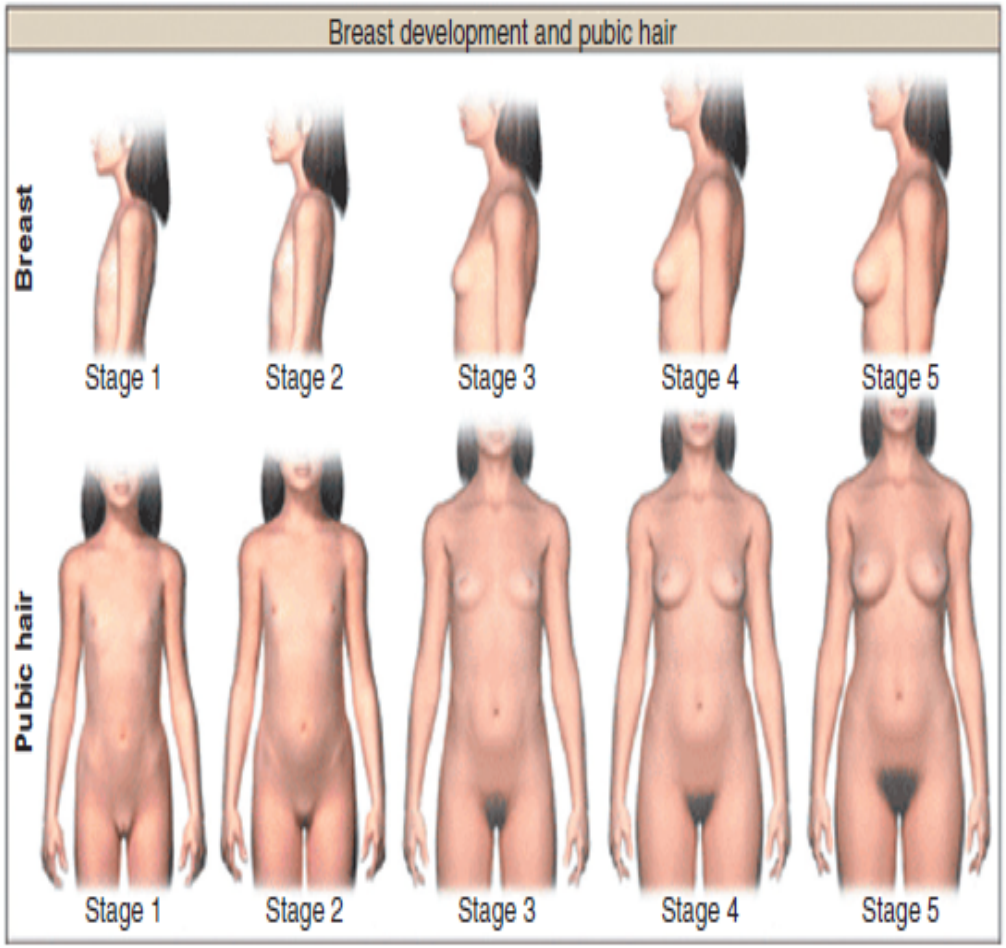

Table 38-1 Classification of Breast Growth and Pubic Hair Growth

Classification	Description
Breast Growth	
B1	Prepubertal: elevation of papilla only
B2	Breast budding
B3	Enlargement of breasts with glandular tissue, without separation of breast contours
B4	Secondary mound formed by areola
B5	Single contour of breast and areola
Pubic Hair Growth	
PH1	Prepubertal—no pubic hair
PH2	Labial hair present
PH3	Labial hair spreads over mons pubis
PH4	Slight lateral spread
PH5	Further lateral spread to form inverse triangle and reach medial thighs

- Comprehensive Gynecology 7th edition, 2017 (Lobo RA, Gershenson DM, Lentz GM, Valea FA *editors);* chapter 38: Primary and Secondary Amenorrhea; pp 829-852

PUBERTY DEVELOPMENT

- The first sign of puberty is usually the appearance of breast budding followed within a few months by the appearance of pubic hair.
- The earliest detectable secondary sexual characteristic on physical examination in most girls is breast/areolar development (thelarche)
- Sequence of pubertal development:

Breast budding → pubic hair →growth spurt → menarche

- Breast budding is the earliest sign of puberty and menarche the latest.
- The mean interval between breast budding and menarche is **2.3 yrs ± 1 yr**

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PUBERTY DEVELOPMENT

- ratio of fat to both total body weight and lean body weight is probably the most relevant factor that determines the time of onset of puberty and menstruation.
- Adolescents who are moderately obese have an earlier onset of menarche than nonobese women.
- Malnutrition, such as occurs with anorexia nervosa or starvation, is known to delay the onset of puberty.

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PUBERTY DEVELOPMENT

- girls engaged in premenarchal athletic training, menarche is **delayed 0.4 year for each year of training.**
- Individuals who exercise strenuously should be counseled that they will usually have a delayed onset of menses, but it is not a health problem.
- They should be told that they will most likely have regular ovulatory cycles when they stop exercising or become older.

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PUBERTY DEVELOPMENT

- The initial endocrinologic change associated with the onset of puberty is the occurrence of episodic pulses of LH occurring during sleep
- These pulses are absent before the onset of puberty. After menarche, the episodic secretions of LH occur during sleep and while awake.
- The last endocrinologic event of puberty is activation of the positive gonadotropin response to increasing levels of estradiol, which results in the midcycle gonadotropic surge and ovulation.

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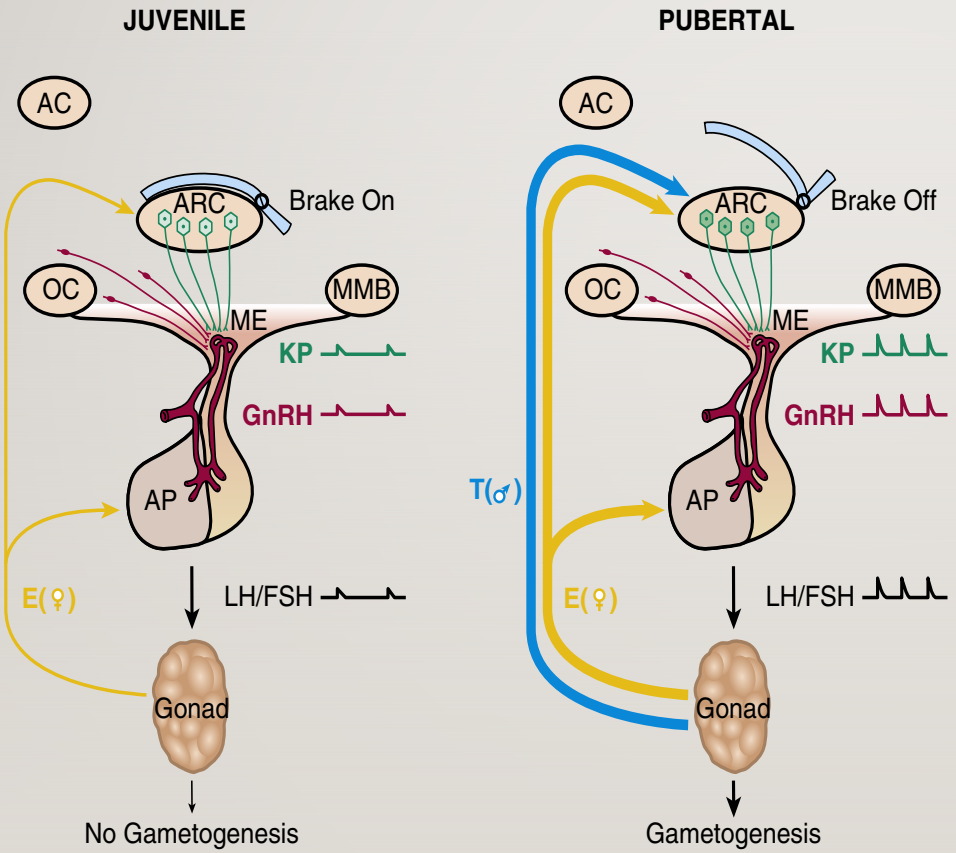
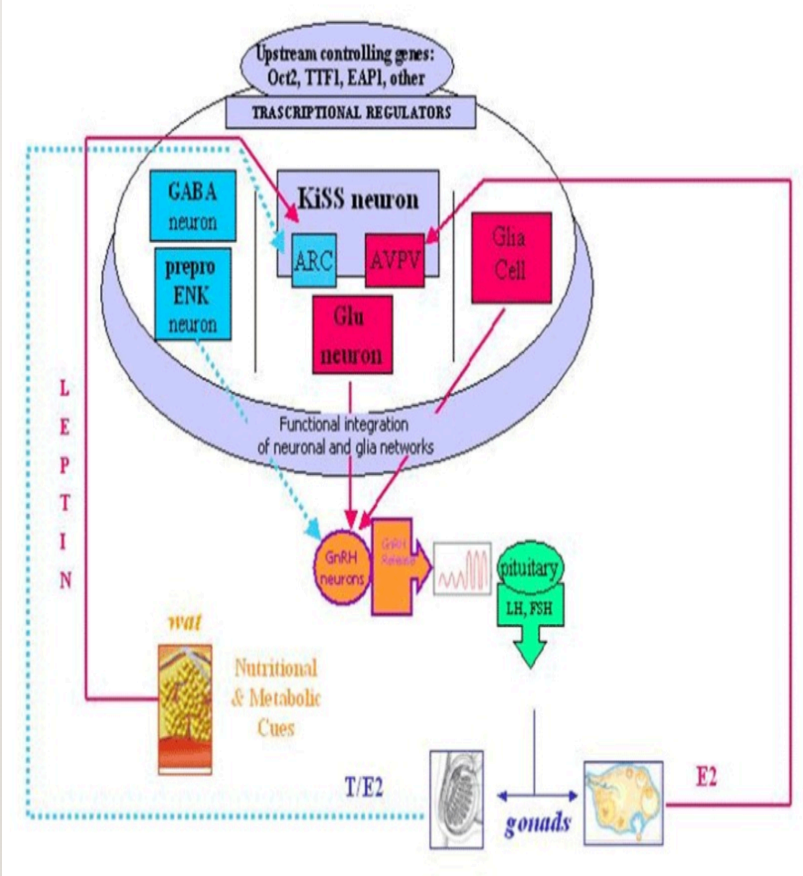
CONTROL OF TIMING IN PUBERTY





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DEFINITION OF TERMS

- **Primary amenorrhea**: the absence of menses in a woman who has never menstruated by the age of 15 years.
- **Secondary amenorrhea**: as the absence of menses for an arbitrary period, usually longer than 6 to 12 months
- **Cryptomenorrhea:** anatomic disorder blocking the outflow of menses. Ex. Imperforate hymen, transverse vaginal septum

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WORLD HEALTH ORGANIZATION (WHO) CLASSIFICATION OF AMENORRHEA

- **WHO type I** usually refers to women with low estrogen levels and low follicle-stimulating hormone (FSH) and prolactin (PRL) levels without central nervous system (CNS) lesions
  - Example: Anorexia nervosa
- **WHO type II** refers to a normal estrogen status with normal FSH and PRL levels
  - Example: PCOS
- **WHO type III** refers to low estrogen levels and a high FSH level, denoting ovarian failure.
  - Example: Premature ovarian insufficiency

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PRIMARY AMENORRHEA

PRIMARY AMENORRHEA

- defined as the absence of menses in a woman who has never menstruated by the age of 15 years, but with breast development.
- Absence of menses by age 13, with no breast development.
- definition includes girls who have not menstruated within 5 years of breast development
- The incidence of primary amenorrhea is less than 0.1%.

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PRIMARY AMENORRHEA

- some girls with secondary sexual characteristics may present before age 15 years with amenorrhea and cyclic pelvic pain.
  - These girls should be evaluated for possible outflow tract obstruction (cryptomenorrhea)

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PRIMARY AMENORRHEA

	With Breast	Without Breast
With Uterus	+ + (4)	- + (1)
Without uterus	+ - (2)	- - (3)

Box 38-1 Classification of Disorders with Primary Amenorrhea and Normal Female External Genitalia

I. Absent breast development; uterus present
  A. Gonadal failure **- /+**
    1. 45,X (Turner's syndrome)
    2. 46,X, abnormal X (e.g., short- or long-arm deletion)
    3. Mosaicism (e.g., X/XX, X/XX,XXX)
    4. 46,XX or 46,XY pure gonadal dysgenesis
    5. 17α-hydroxylase deficiency with 46,XX
  B. Hypothalamic failure secondary to inadequate GnRH release
    1. Insufficient GnRH secretion because of neurotransmitter defect
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    4. CNS neoplasm (craniopharyngioma)
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    3. Mumps, encephalitis
    4. Newborn kernicterus
    5. Prepubertal hypothyroidism

II. Breast development; uterus absent
  A. Androgen resistance (testicular feminization)
  B. Congenital absence of uterus (uterovaginal agenesis)

III. Absent breast development; uterus absent **+ /-**
  A. 17,20-desmolase deficiency
  B. Agonadism
  C. 17α-hydroxylase deficiency with 46,XY karyotype **- /-**

IV. Breast development; uterus present
  A. Hypothalamic cause
  B. Pituitary cause
  C. Ovarian cause
  D. Uterine cause **+ /+**

CNS, Central nervous system; GnRH, gonadotropin-releasing hormone.

- Comprehensive Gynecology 7th edition, 2017 (Lobo RA, Gershenson DM, Lentz GM, Valea FA *editors)*; chapter 38: Primary and Secondary Amenorrhea; pp 829-852

A. BREAST ABSENT, UTERUS PRESENT

- Breast development is a biomarker of ovarian estrogen production
- Women with *no breast development* and a uterus present *have no estrogen production.*
- This is either the result of a primary ovarian disorder or a CNS hypothalamic-pituitary abnormality, which provides the normal signal to the ovary.

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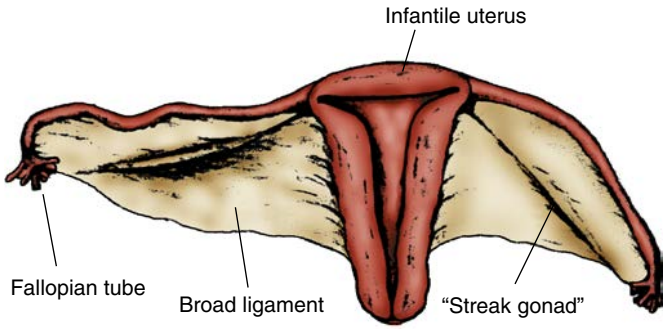

Figure 38.6 Internal genitalia of patient with gonadal dysgenesis (Turner syndrome), featuring normal but infantile uterus, normal fallopian tubes, and pale, glistening streak gonads in both broad ligaments. (From Federman DD. Disorders of gonadal development: gonadal dysgenesis [Turner syndrome]. In: Federman DD, ed. *Abnormal Sexual Development: A Genetic and Endocrine Approach to Differential Diagnosis.* Philadelphia: WB Saunders; 1967.)

- Failure of gonadal development is *the most common cause of primary amenorrhea.*
- Gonadal failure is most frequently caused by a chromosomal disorder or deletion of all or part of an X chromosome, and rarely, *17a-hydroxylase deficiencies.*
- In place of the ovary a band of fibrous tissue called a **gonadal streak** is present.

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A. BREAST ABSENT, UTERUS PRESENT

- When ovarian follicles are absent, synthesis of ovarian steroids and inhibin does not occur.
- Breast development does not occur because of the low circulating E2 levels.
- Because the negative hypothalamic- pituitary action of estrogen and inhibin is not present, gonadotropin levels are markedly elevated, with FSH levels being higher than LH
- Estrogen is not necessary for mullerian duct development or wolffian duct regression, so the internal and external genitalia are phenotypically normal female.

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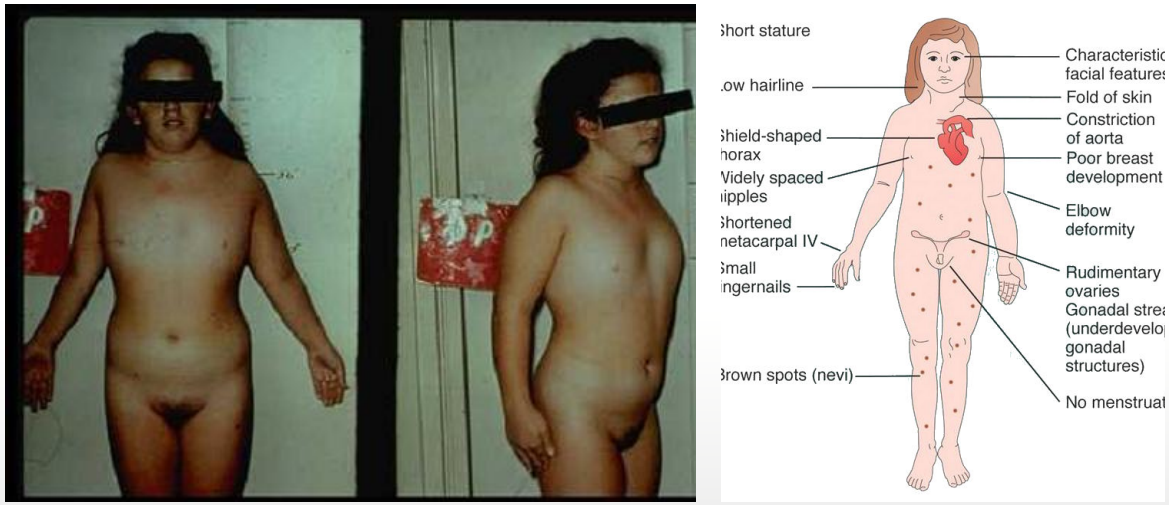

TURNERS SYNDROME (45, X 0)

A. BREAST ABSENT, UTERUS PRESENT

- Individuals with gonadal failure and an X chromosome abnormality are shorter than 63 inches in height.
  - *Deletion of the entire X chromosome (as occurs in Turner syndrome) or of the short arm (p) of the X chromosome results in short stature. Deletions of only the long arm (q) usually do not affect height.*
- Approximately one third of individuals with gonadal failure have major cardiovascular or renal abnormalities.
- The diagnosis of gonadal failure, or hypergonadotropic hypogonadism can be established if the FSH level exceeds 30 mIU/mL.

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A. BREAST ABSENT, UTERUS PRESENT

- Individuals with gonadal failure should have a peripheral karyotype obtained to determine whether a Y chromosome is present (Ex 45 X0/46 XY).
  - If it is present, or signs of hyperandrogenism are present, the gonads should be excised to prevent development of malignancy, mainly a gonadoblastoma.

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A. BREAST ABSENT, UTERUS PRESENT

- Rarely, individual with mosaicism, an abnormal X chromosome, pure gonadal dysgenesis (46,XX), or even Turner syndrome (45,X) *may have a few follicles* that develop under endogenous gonadotropin stimulation early in puberty
  - Follicles may synthesize enough estrogen to induce breast development and a few episodes of uterine bleeding
  - However, these women usually experience **premature ovarian failure**, usually before age 25.
  - Very rarely, ovulation and pregnancy can occur.

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A. BREAST ABSENT, UTERUS PRESENT

Pure Gonadal Dysgenesis (46,XX and 46,XY with Gonadal Streaks)

- These individuals have normal stature and phenotype, absence of secondary sexual characteristics, and primary amenorrhea. Some of these women have a few ovarian follicles, develop breasts, and may even menstruate spontaneously for a few years.
- **46,XY gonadal dysgenesis** is the result of an abnormal testis in utero. Also called as **Swyer syndrome.**
  - Female appearance and female external genitalia, with uterus, 30% of women develop breasts, but with XY karyotype

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A. BREAST ABSENT, UTERUS PRESENT

17 α-Hydroxylase Deficiency with 46,XX Karyotype

- A rare gonadal cause of primary amenorrhea (it can also occur in genetic males 46,XY)
- Because of decreased cortisol, ACTH levels are elevated.
- The mineralocorticoid levels are also elevated, because 17α-hydroxylase is not necessary for the conversion of progesterone to deoxycortisol or corticosterone.
- Thus there is excessive sodium retention and potassium excretion leading to hypertension and hypokalemia.
- Serum progesterone levels are also elevated because progesterone is not converted to cortisol.
- In addition to sex steroid replacement, these individuals need cortisol administration.
- They usually have cystic ovaries and viable oocytes.

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A. BREAST ABSENT, UTERUS PRESENT

Inadequate Gonadotropin-Releasing Hormone Release (Hypogonadotropic Hypogonadism)

- basic defect is either hypothalamic with insufficient GnRH synthesis or a CNS neurotransmitter defect, resulting in inadequate GnRH synthesis, release, or both.
- anosmia may also occur in some patients with gonadotropin deficiency.
- Usually caused by a specific defect of the *KAL* gene (Xp 22-3), which is responsible for neuronal migration. Other genetic defects resulting in gonadotropic deficiency may occur on the X chromosome or autosomes and include FGFR1, PROKR2, and GNRHR as well as loss of function mutations in the kisspeptin-1 receptor

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A. BREAST ABSENT, UTERUS PRESENT

Inadequate Gonadotropin-Releasing Hormone Release (Hypogonadotropic Hypogonadism)

- Females with **Kallmann syndrome** and related forms of gonadotropic deficiency have normal height and an increase in growth of long bones, resulting in a greater wingspan-to-height ratio.
- Anosmia in Kallmann syndrome must be tested for by blinded testing of certain characteristic smells, such as coffee, cocoa, or orange.

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    4. Newborn kernicterus
    5. Prepubertal hypothyroidism

II. Breast development; uterus absent — + /-
  A. Androgen resistance (testicular feminization)
  B. Congenital absence of uterus (uterovaginal agenesis)

III. Absent breast development; uterus absent — - /-
  A. 17,20-desmolase deficiency
  B. Agonadism
  C. 17α-hydroxylase deficiency with 46,XY karyotype

IV. Breast development; uterus present — + /+
  A. Hypothalamic cause
  B. Pituitary cause
  C. Ovarian cause
  D. Uterine cause

CNS, Central nervous system; GnRH, gonadotropin-releasing hormone.

B. BREAST PRESENT, UTERUS ABSENT

- Only 2 conditions represent this group:
  - Androgen resistance
  - congenital absence of the uterus.

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B. BREAST PRESENT, UTERUS ABSENT:

ANDROGEN RESISTANCE SYNDROME/ ANDROGEN INENSITIVITY SYNDROME (AIS)/ "TESTICULAR FEMINIZATION SYNDROME"

- absence of an X-chromosome gene responsible for cytoplasmic or nuclear testosterone receptor function.
- XY karyotype, with normally functioning male gonads that produce *normal male levels of testosterone and dihydrotestosterone*.
- because of a *lack of androgen receptors in target organs*, there is lack of male differentiation of the external and internal genitalia
- The external genitalia remain feminine, as occurs in the absence of sex steroids. Wolffian duct development, which normally occurs as a result of testosterone stimulation, fails to take place.

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- Because müllerian duct regression is induced by antimüllerian hormone (AMH), this process occurs normally in these individuals because steroid receptors are unnecessary for the action of AMH.
- no female or male internal genitalia, normal female external genitalia, and a short or absent vagina. Pubic hair and axillary hair are absent or scanty as a result of a lack of androgenic receptors

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ANDROGEN RESISTANCE SYNDROME/ ANDROGEN INENSITIVITY SYNDROME (AIS)/ "TESTICULAR FEMINIZATION SYNDROME"

- breast development is normal or enhanced.
- *WHY DO THESE "XY women" have breasts?*
  - Testosterone is responsible for inhibiting breast proliferation.
  - Thus in androgen resistance, the absence of androgen action allows even low levels of estrogen to cause unabated breast stimulation.
  - Estrogen levels here are in the normal male range, and LH is slightly elevated.

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B. BREAST PRESENT, UTERUS ABSENT:
ANDROGEN INSENSITIVITY SYNDROME

- Testosterone present
- Target organs/cells lack receptors for testosterone
- No masculinizing effects occur

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B. BREAST PRESENT, UTERUS ABSENT:

CONGENITAL ABSENCE OF THE UTERUS (UTERINE AGENESIS, UTEROVAGINAL AGENESIS, MAYER-ROKITANSKY-KUSTER-HAUSER SYNDROME (MRKH))

- second most frequent cause of primary amenorrhea.
- have normal ovaries, with regular cyclic ovulation and normal endocrine function
- Associated with congenital renal abnormalities, skeletal abnormalities, and cardiac and other congenital abnormalities
- Congenital renal abnormalities occur in approximately one third of women with congenital absence of the uterus.

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IV. Breast development; uterus present — + /+
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CNS, Central nervous system; GnRH, gonadotropin-releasing hormone.

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C. BREAST ABSENT, UTERUS ABSENT

- usually have a male karyotype, elevated gonadotropin levels, and testosterone levels in the normal or below-normal female range.
- Differential diagnosis for this phenotype includes 17a-hydroxylase deficiency, 17,20-desmolase deficiency, and agonadism.
- lack the enzyme necessary to synthesize sex steroids, and thus have female external genitalia.
- Because they have testes, AMH is produced and the female internal genitalia regress;
- With low testosterone levels, the male internal genitalia do not develop. Insufficient estrogen is synthesized so no breasts develop.

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D. BREAST PRESENT, UTERUS PRESENT

- second largest category of individuals with primary amenorrhea
- The most important and probably most common cause of amenorrhea in adolescent girls is **anorexia nervosa.**
- "athlete"/"exercise" amenorrhea among adolescent athletes
- May include females with genital tract obstruction presenting with cryptomenorrhea:
  - Eg, imperforate hymen, transverse vaginal septum

- Comprehensive Gynecology 7th edition, 2017 (Lobo RA, Gershenson DM, Lentz GM, Valea FA *editors);* chapter 38: Primary and Secondary Amenorrhea; pp 829-852

PRIMARY AMENORRHEA

	With Breast	Without Breast
With Uterus	+ +	- +
Without uterus	+ -	_ _

Box 38-1 Classification of Disorders with Primary Amenorrhea and Normal Female External Genitalia

I. Absent breast development; uterus present — - /+
  A. Gonadal failure
    1. 45,X (Turner's syndrome)
    2. 46,X, abnormal X (e.g., short- or long-arm deletion)
    3. Mosaicism (e.g., X/XX, X/XX,XXX)
    4. 46,XX or 46,XY pure gonadal dysgenesis
    5. 17α-hydroxylase deficiency with 46,XX
  B. Hypothalamic failure secondary to inadequate GnRH release
    1. Insufficient GnRH secretion because of neurotransmitter defect
    2. Inadequate GnRH synthesis (Kallman's syndrome)
    3. Congenital anatomic defect in central nervous system
    4. CNS neoplasm (craniopharyngioma)
  C. Pituitary failure
    1. Isolated gonadotrophin insufficiency (thalassemia major, retinitis pigmentosa)
    2. Pituitary neoplasia (chromophobe adenoma)
    3. Mumps, encephalitis
    4. Newborn kernicterus
    5. Prepubertal hypothyroidism

II. Breast development; uterus absent — + /-
  A. Androgen resistance (testicular feminization)
  B. Congenital absence of uterus (uterovaginal agenesis)

III. Absent breast development; uterus absent — - /-
  A. 17,20-desmolase deficiency
  B. Agonadism
  C. 17α-hydroxylase deficiency with 46,XY karyotype

IV. Breast development; uterus present — + /+
  A. Hypothalamic cause
  B. Pituitary cause
  C. Ovarian cause
  D. Uterine cause

CNS, Central nervous system; GnRH, gonadotropin-releasing hormone.

- Comprehensive Gynecology 7th edition, 2017 (Lobo RA, Gershenson DM, Lentz GM, Valea FA *editors);* chapter 38: Primary and Secondary Amenorrhea; pp 829-852

EVALUATION AND MANAGEMENT OF PRIMARY AMENORRHEA

MANAGEMENT

- Rule out pregnancy!
- Do a thorough history and physical exam (examine breasts, uterus, height, weight)
- Request for:
  - Karyotyping (XY OR XX?)
  - FSH (Hypergonadotropic levels (high FSH) → gonadal failure)

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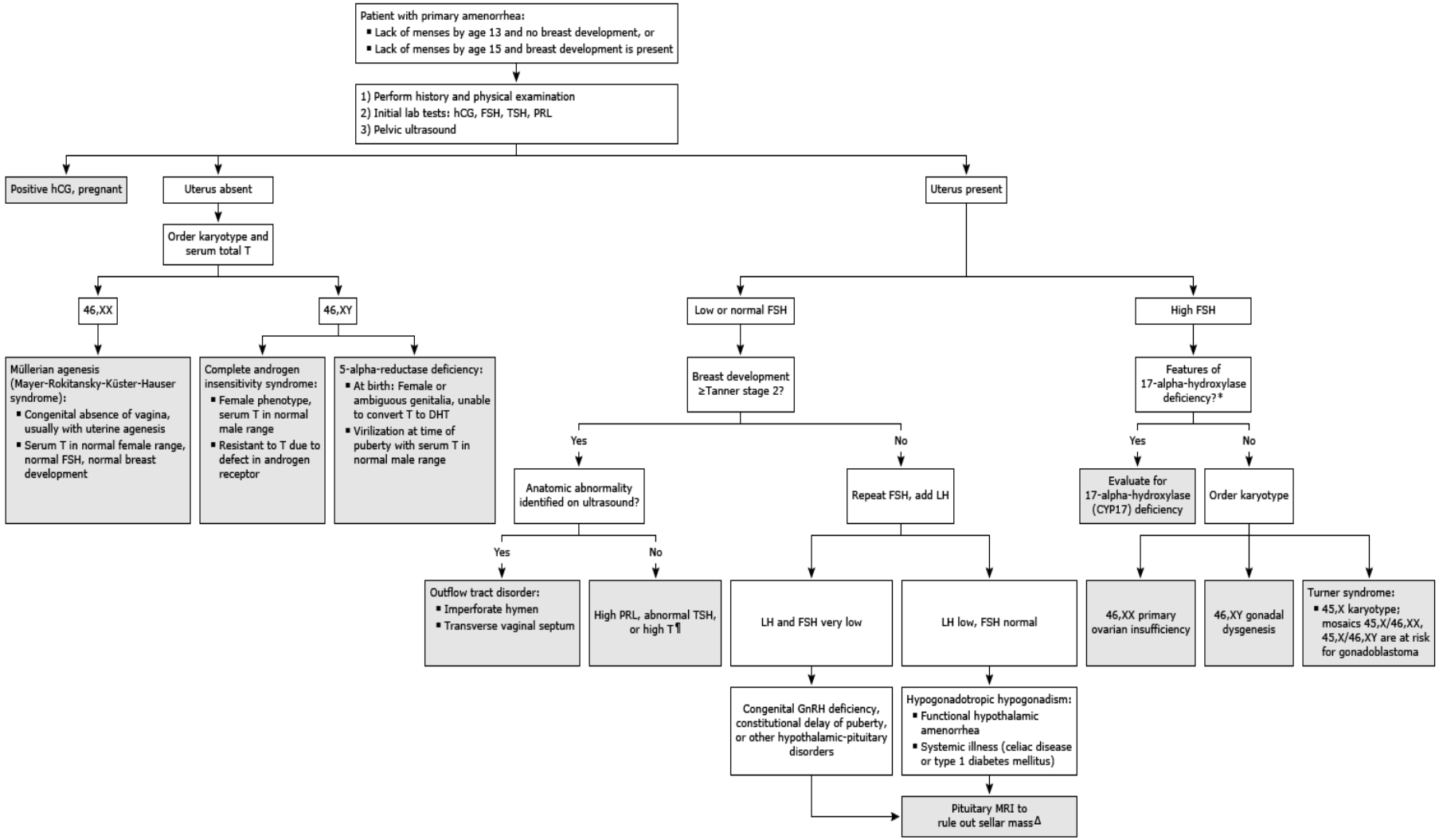
Evaluation of primary amenorrhea



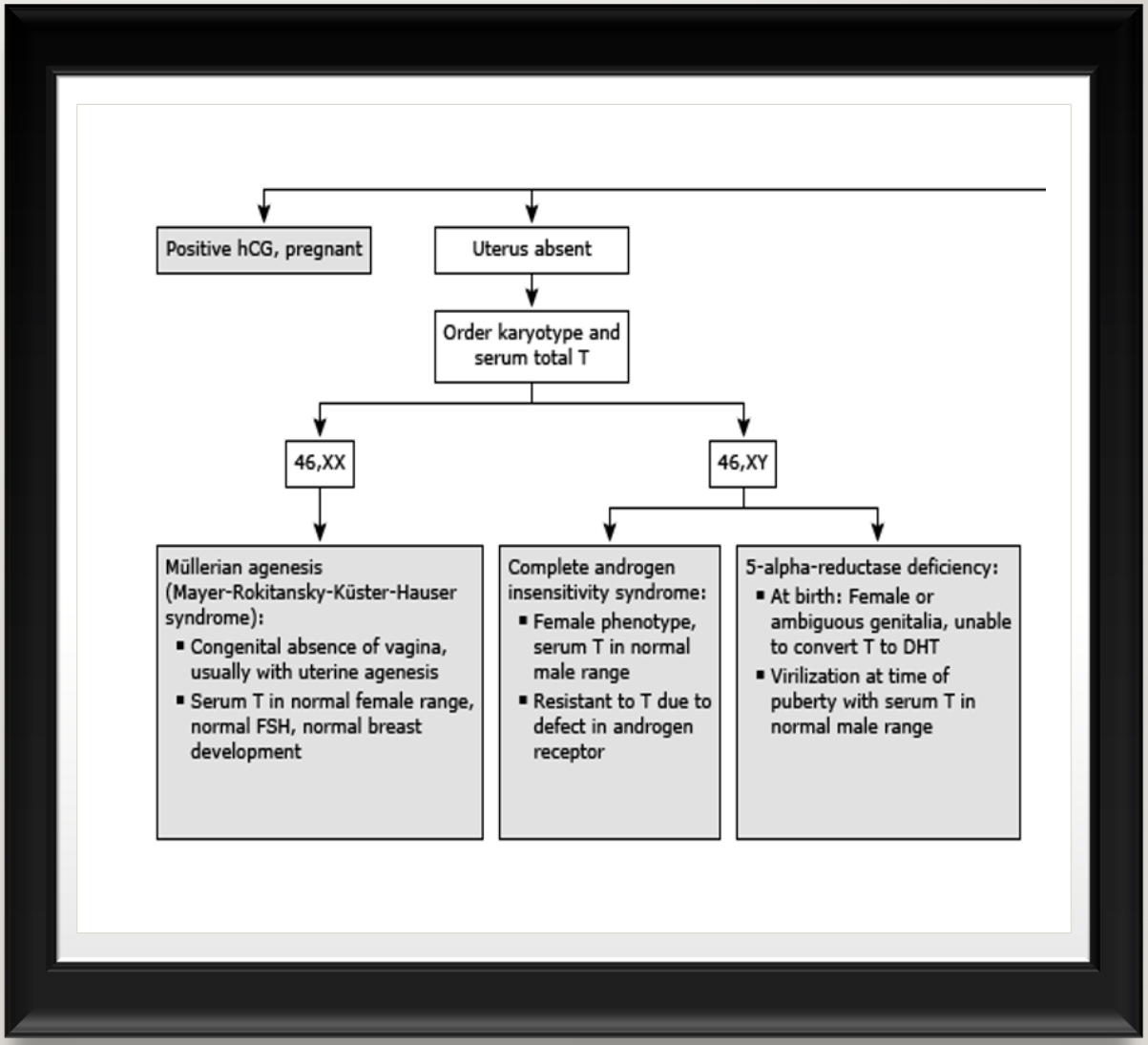
hCG: human chorionic gonadotropin; FSH: follicle-stimulating hormone; TSH: thyroid-stimulating hormone; PRL: prolactin; T: testosterone; DHT: dihydrotestosterone; LH: luteinizing hormone; GnRH: gonadotropin-releasing hormone; MRI: magnetic resonance imaging; PCOS: polycystic ovary syndrome.

* In addition to primary amenorrhea: hypertension (which can be severe), absence of secondary sexual characteristics, or minimal body hair. Refer to UpToDate topics on uncommon congenital adrenal hyperplasias.

¶ Refer to UpToDate topics on the evaluation of secondary amenorrhea for discussion of hyperprolactinemia, thyroid disease, and PCOS.

Δ Pituitary MRI not required in those with clear explanation for their hypogonadotropic amenorrhea, eg, celiac disease or type 1 diabetes mellitus. Refer to UpToDate topics on the evaluation and management of secondary amenorrhea.

UTERUS ABSENT



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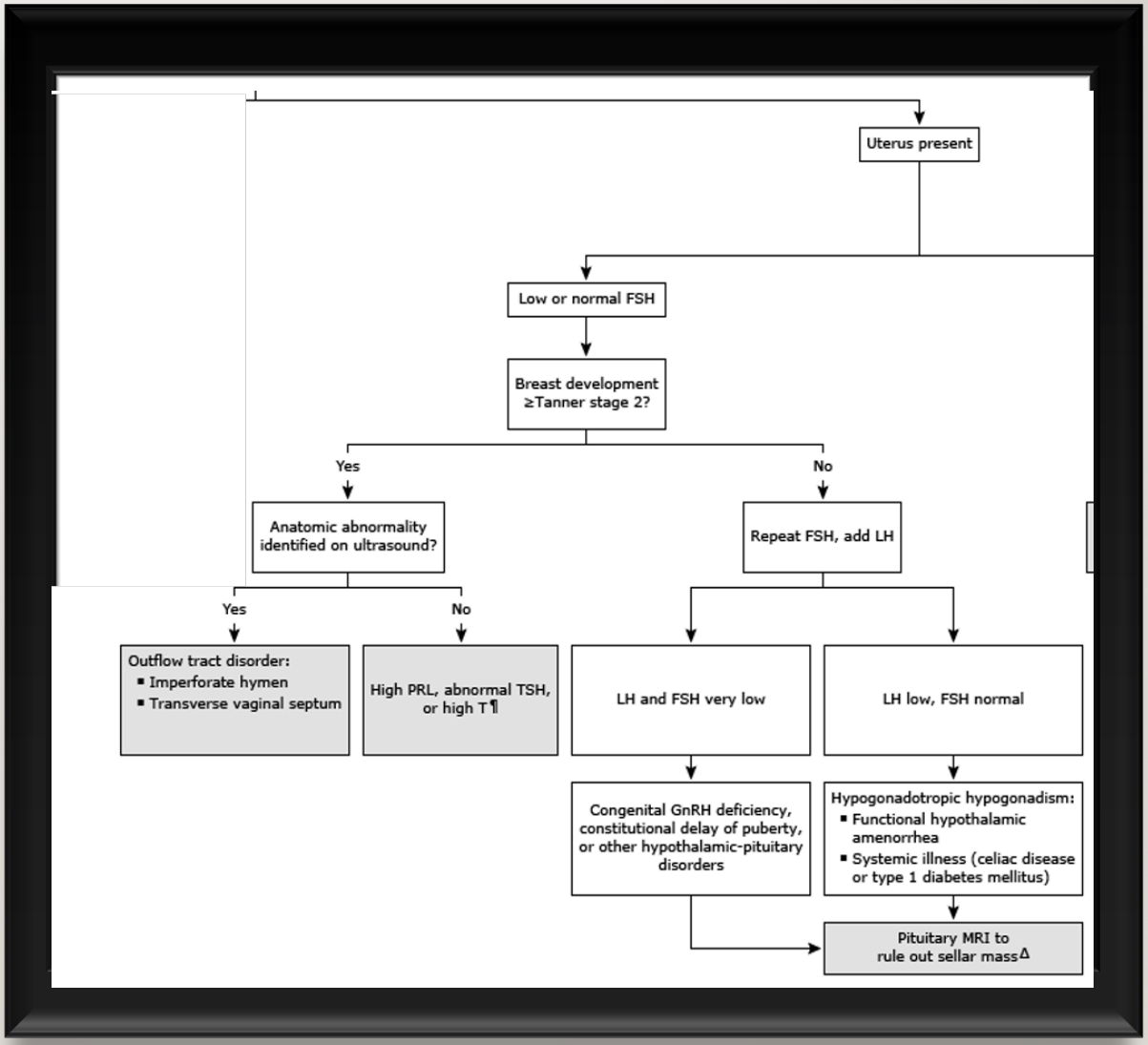
UTERUS PRESENT, LOW TO NORMAL FSH



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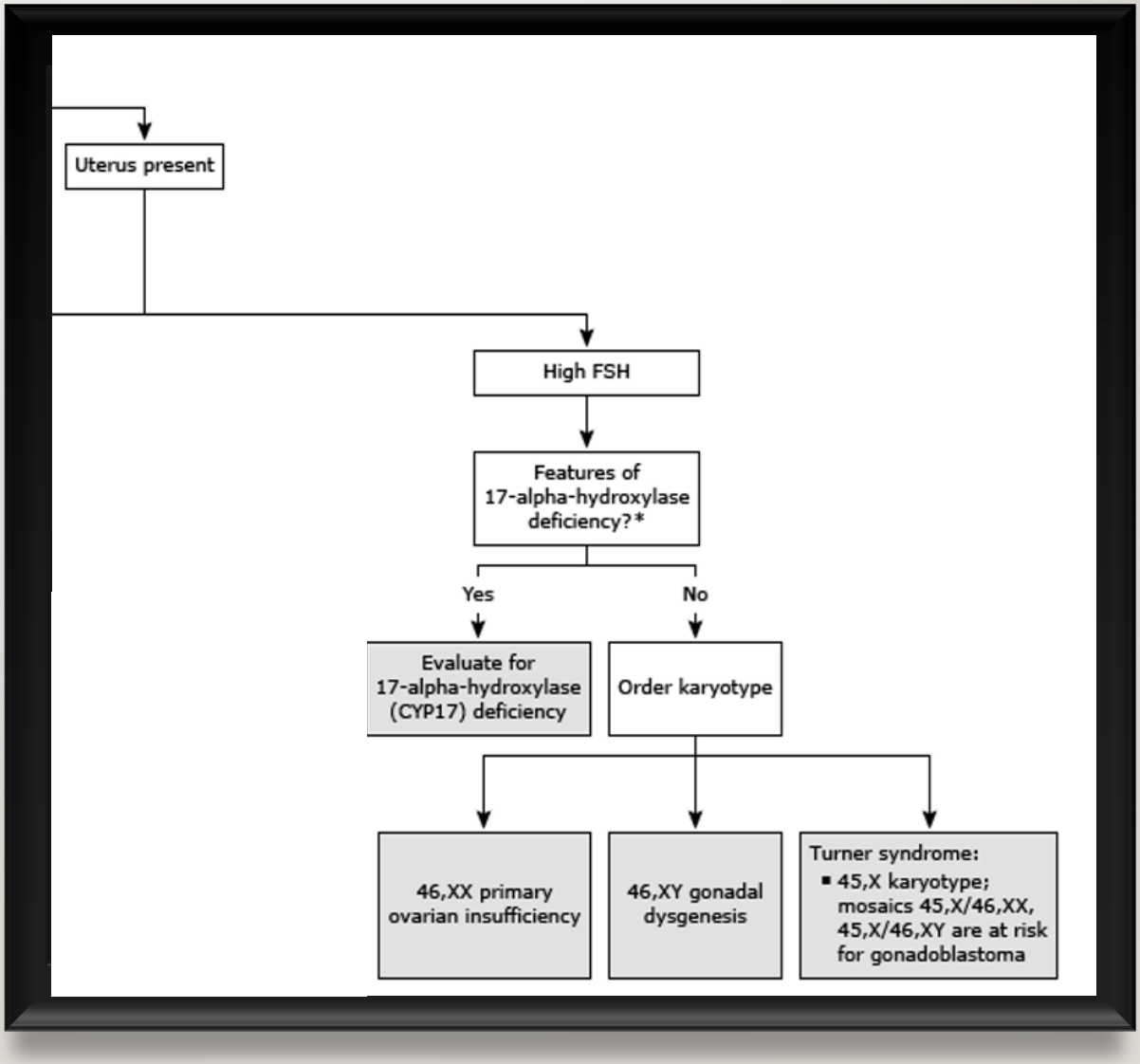
UTERUS PRESENT, HIGH FSH



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MANAGEMENT

- Treatment of primary amenorrhea is directed at correcting the underlying pathology (if possible), helping the woman to achieve fertility (if possible), and prevention of complications of the disease process (eg, estrogen replacement to prevent osteoporosis).
- Psychological counseling is particularly important in patients with absent müllerian structures and/or a Y chromosome.
- Surgery may be required in patients with either congenital anatomic lesions or Y chromosome material.

MANAGEMENT

- The etiology of the primary amenorrhea will determine the type of surgical procedure required.
- EXAMPLE:
  - surgical correction of a vaginal outlet obstruction is necessary as soon as the diagnosis is made after menarche to allow passage of menstrual blood.
  - Creation of a neovagina for patients with müllerian failure is usually delayed until the women are emotionally mature and ready to participate in the postoperative care required to maintain vaginal patency.

MANAGEMENT

- For patients in whom *Y chromosomal material* is found, *gonadectomy should be performed to prevent the development of gonadal neoplasia*
  - Gonadectomy is typically delayed until after puberty in patients with complete androgen insensitivity syndrome
  - These patients have a normal pubertal growth spurt and feminize at the time of expected puberty; tumors do not usually develop until after this time.

MANAGEMENT

- In general, in women of reproductive age with hypoestrogenism, hormone replacement is important to prevent bone loss, prevent the potential excess risk of premature coronary heart disease, and develop the breasts.
  - Doses of **conjugated equine estrogen (CEE) in the range of 0.625 mg** or its equivalent are usually sufficient to cause breast proliferation.

MANAGEMENT

- Functional hypothalamic amenorrhea (eg anorexia nervosa or "athlete amenorrhea") can usually be reversed by weight gain, reduction in the intensity of exercise, and/or resolution of illness or emotional stress.
- For women who want to continue to exercise or are unable to improve their nutritional health, estrogen-progestin replacement therapy should be given to those not seeking fertility as it has been demonstrated to improve bone mineral density

MANAGEMENT

- For women with hypothalamic or pituitary dysfunction that is not reversible (eg, congenital GnRH deficiency).
  - either exogenous gonadotropins or pulsatile GnRH can be given.
- Advances in assisted reproductive technologies (ART) now make it possible for many women with primary amenorrhea to participate in reproduction.

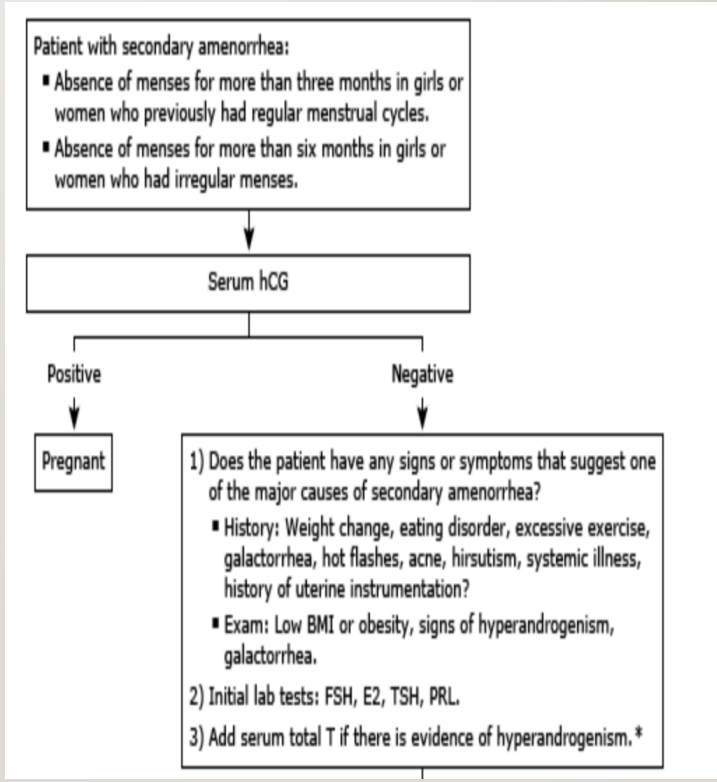
SECONDARY AMENORRHEA

SECONDARY AMENORRHEA: APPROACH TO EVALUATION

1. **Rule out pregnancy** — A pregnancy test is recommended as a first step in evaluating any woman with secondary amenorrhea.

2. **History** — The woman should be asked about any past medical history, risk factors, or symptoms that might suggest any of the major causes of secondary amenorrhea or oligomenorrhea

   - Has there been stress, change in weight, diet, or exercise habits, or is there an eating disorder or illness (that might result in functional hypothalamic amenorrhea)
   - Is the woman taking any drugs that might cause or be associated with amenorrhea? The drug may be taken for a systemic illness that itself can cause hypothalamic amenorrhea.
   - Is there hirsutism, acne, and a history of irregular menses (suggestive of hyperandrogenism)?
   - Are there any symptoms of estrogen deficiency, including hot flashes, vaginal dryness, poor sleep, or decreased libido?
   - Has the patient had galactorrhea, which suggests hyperprolactinemia?
   - Is there a history of obstetrical catastrophe, severe bleeding, dilatation and curettage, or endometritis or other infection that might have caused scarring of the endometrial lining (Asherman syndrome)?

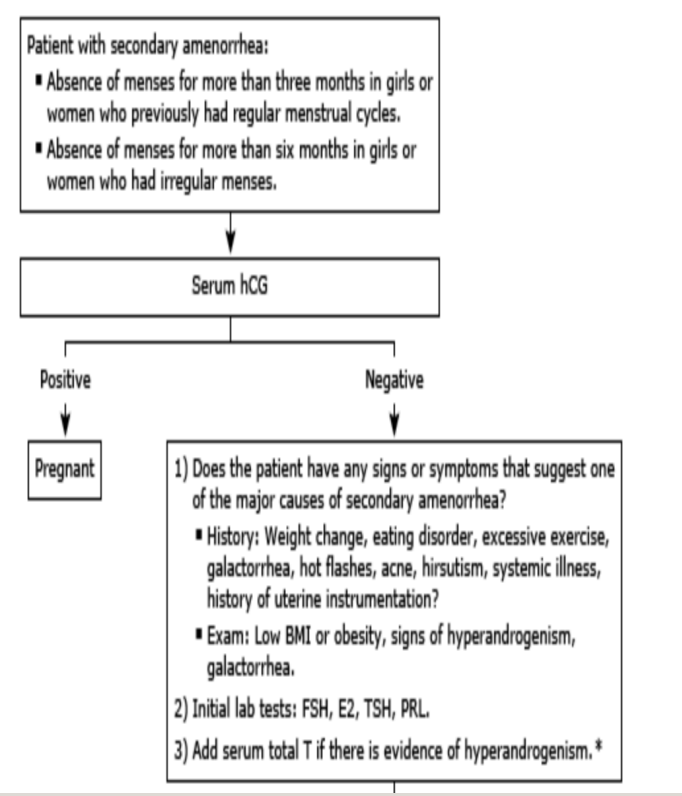


Welt CK, Barbieri RL. Evaluation and Management of Secondary Amenorrhea. 2020.www.uptodate.com

SECONDARY AMENORRHEA: APPROACH TO EVALUATION

3. **Physical exam** — The examination in women with secondary amenorrhea should include measurements of height and weight.

- A body mass index (BMI) greater than 30 kg/m^2 is observed in 50 percent or more of women with PCOS
- Women with a BMI less than 18.5 kg/m^2 may have functional hypothalamic amenorrhea due to an eating disorder, strenuous exercise, or a systemic illness associated with weight loss.
- The patient should also be examined for hirsutism, acne, striae, acanthosis nigricans, vitiligo, and easy bruisability.
- Breasts should be examined for evidence of galactorrhea
- vulvovaginal exam should look for signs of estrogen deficiency.
- Parotid gland swelling and/or erosion of dental enamel would suggest an eating disorder (bulimia nervosa).



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SECONDARY AMENORRHEA

1. **Uterine causes**

   Intrauterine synechiae./ intrauterine adhesions/ Asherman's syndrome → can be caused by Tuberculosis or previous uterine surgery

2. **CNS/Hypothalamic causes**

   - The most frequent cause of secondary amenorrhea is hypothalamic dysfunction.

     a. Lesions: craniopharyngiomas, granulomatous disease (e.g.,tuberculosis, sarcoidosis), and sequelae of encephalitis.

     b. Drugs: Phenothiazine derivatives, certain antihypertensive agents

     c. Stress and exercise (increases CRH that inhibits GnRH release)

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SECONDARY AMENORRHEA

d. Weight loss: the most important and probably most common cause of amenorrhea in adolescent girls is anorexia nervosa.

When women lose 15% below ideal body weight, amenorrhea can occur because of CNS-hypothalamic dysfunction.

When weight loss decreases below 25% of ideal body weight, pituitary gonadotropin function can also become abnormal.

e. Functional hypothalamic amenorrhea: the normal cyclic pattern of LH pulsatility is not present in individuals with functional hypothalamic amenorrhea.

4. • Comprehensive Gynecology 7th edition, 2017 (Lobo RA, Gershenson DM, Lentz GM, Valea FA *editors);* chapter 38: Primary and Secondary Amenorrhea; pp 829-852

SECONDARY AMENORRHEA

3. PCOS

4. Hyperprolactinemia

5. Genetic/autoimmune causes

example: Premature ovarian failure

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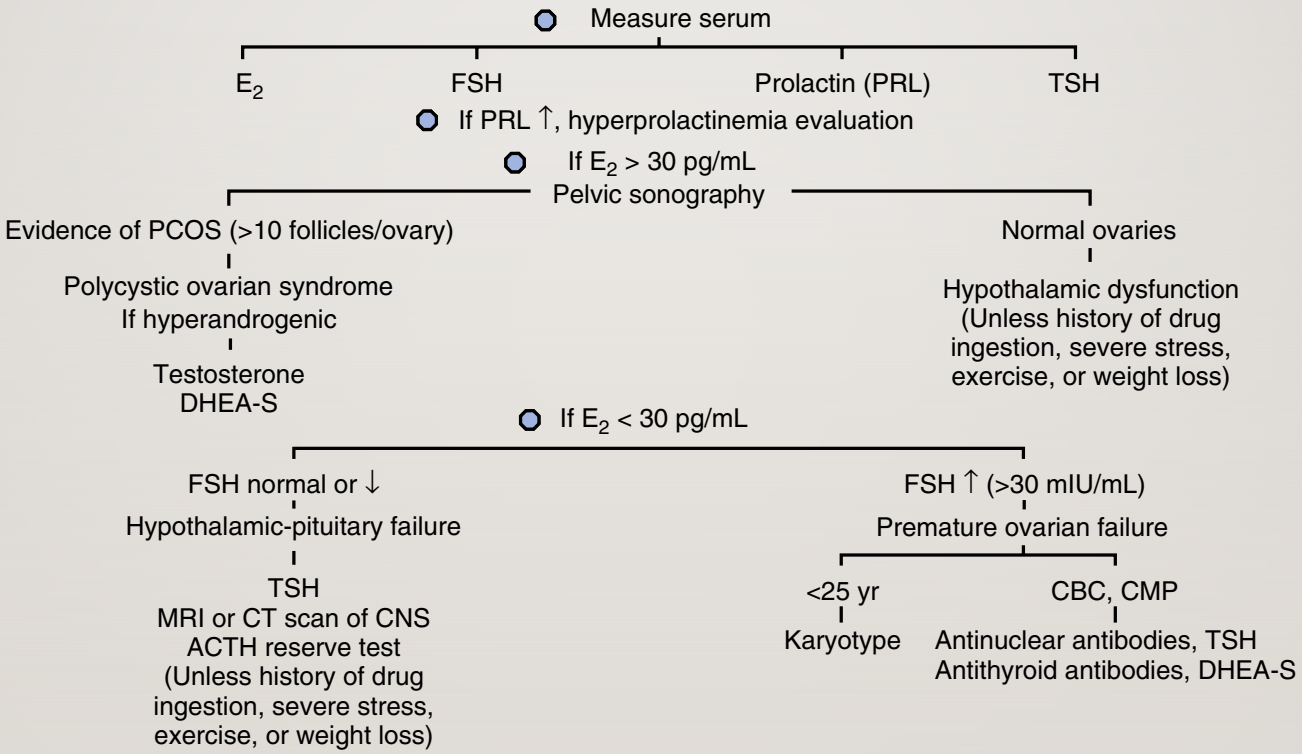
DIAGNOSTIC EVALUATION OF SECONDARY AMENORRHEA



*The threshold level for E_2 is dependent on the normal follicular phase range of the laboratory but is typically around 30 pg/mL.

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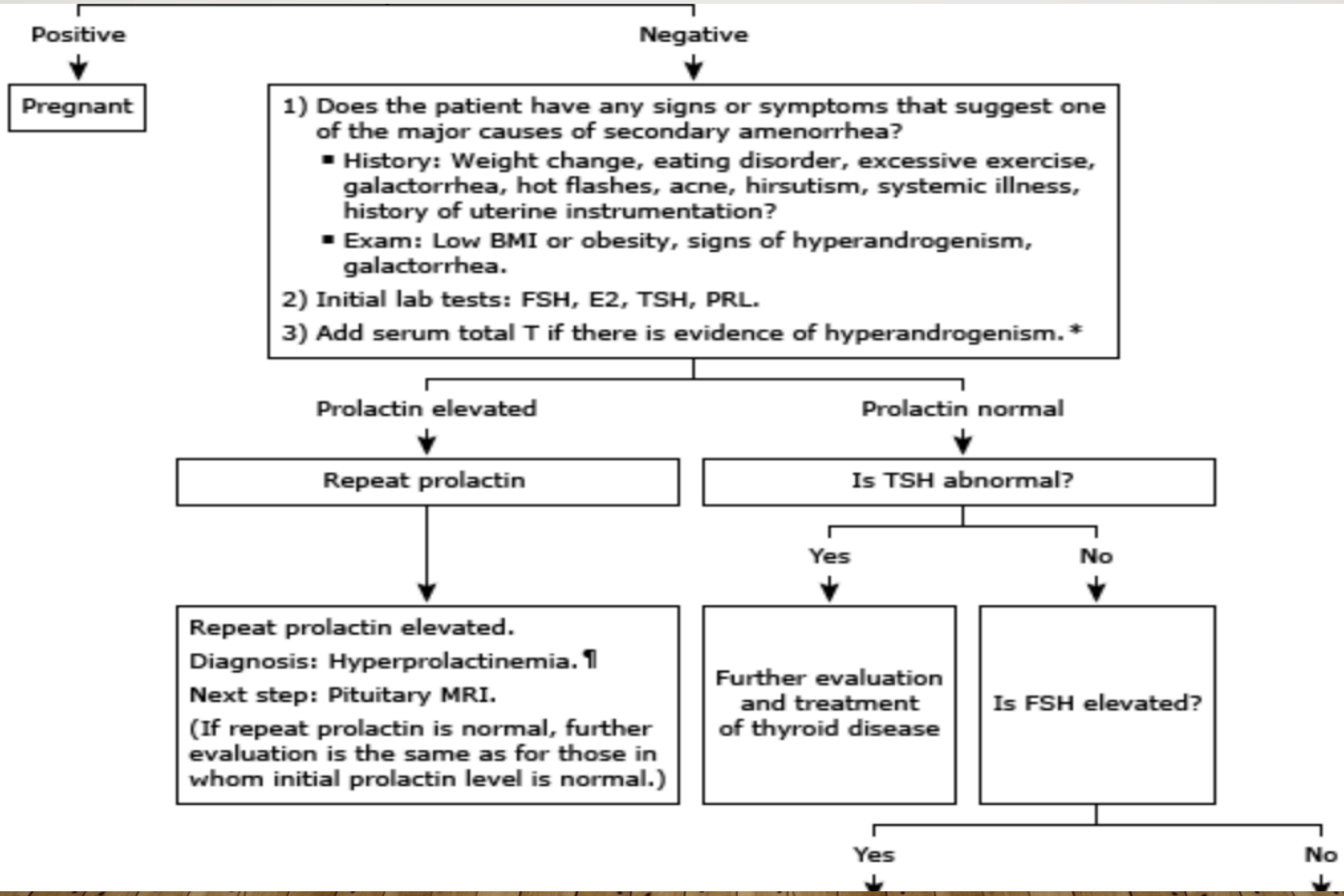
SECONDARY AMENORRHEA: APPROACH TO EVALUATION



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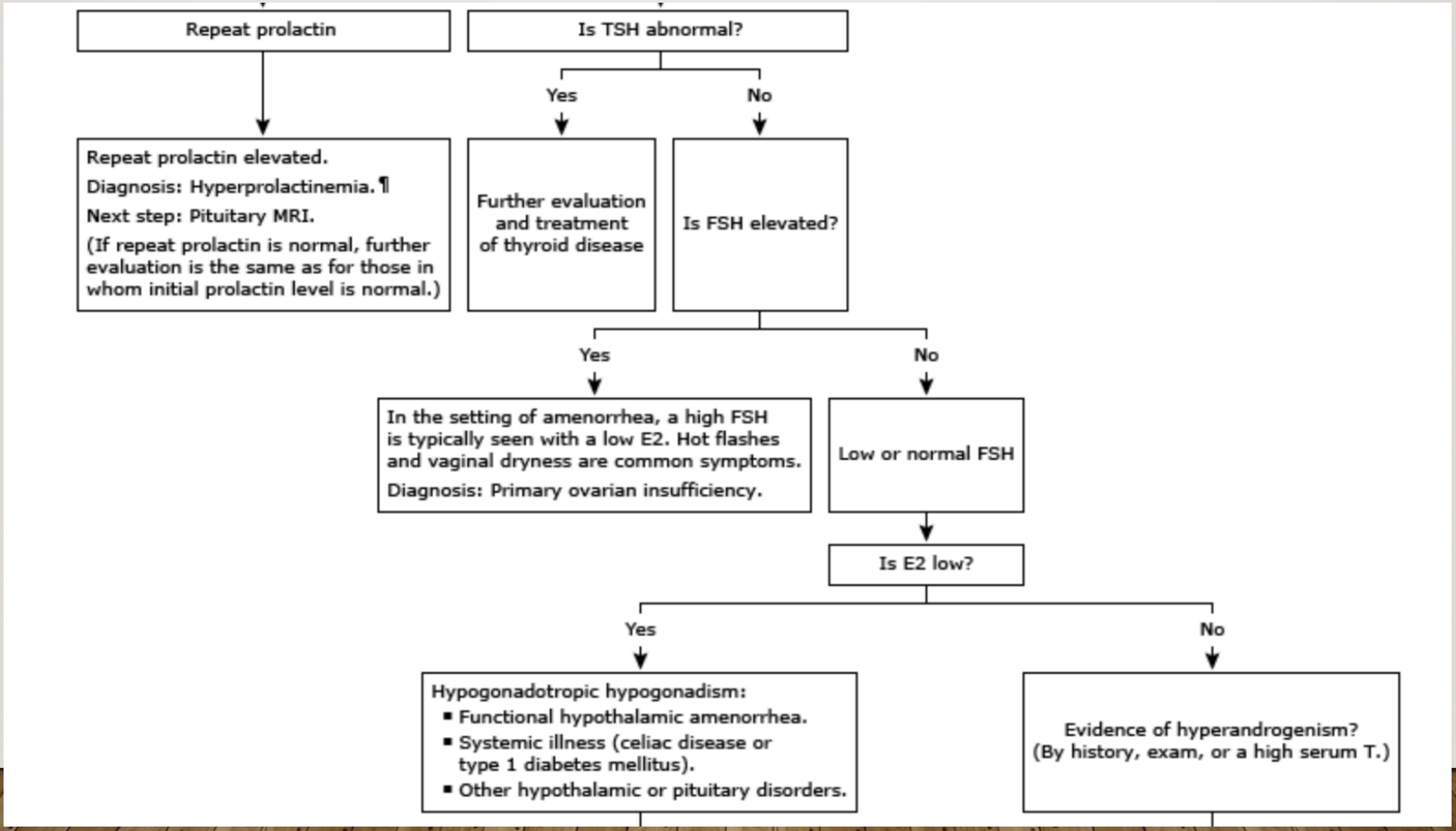

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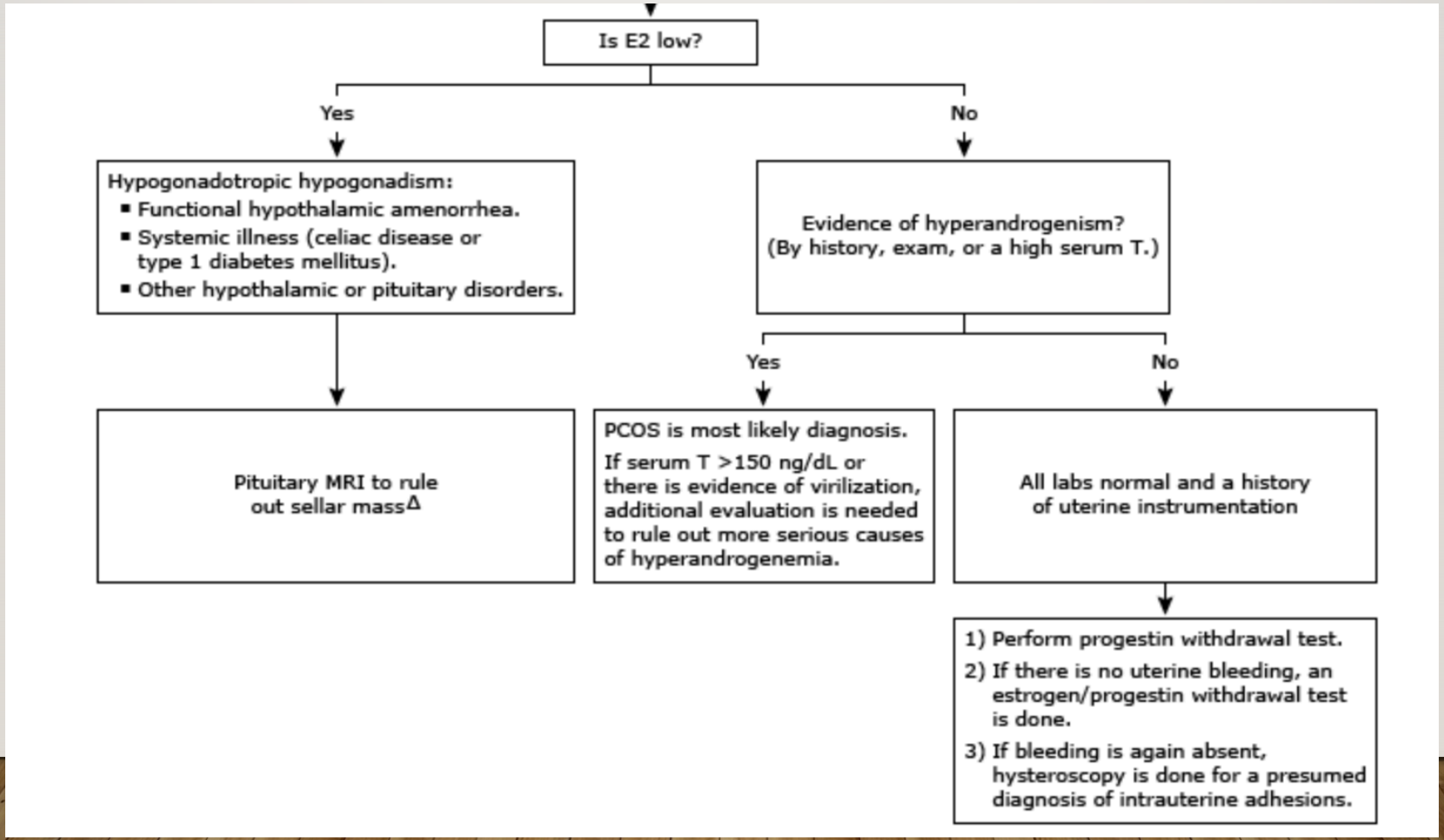

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SUMMARY

- 1. Definition of Terms
- 2. Review: Puberty and Tanner Staging
- 3. Primary Amenorhhea: Definition, Classification, Causes, Evaluation, Treatment
- 4. Secondary Amenorrhea: Causes, Evaluation, Treatment

Thank you!

youtube channel: Ina Irabon

www.wordpress.com: Doc Ina OB Gyne