CREOG Review 12/17/20

Per Dr. Olson-Chen:

The good news is that there were only 3 REI-specific questions that more than 50% of the residents missed. I have included a list of the topics that >1/3 of the residents missed instead.

Here are the CREOG topics (some overlap):

1. Hyperprolactinemia (Williams textbook of endocrinology)
2. Risk factors for ovarian hyperstimulation syndrome (Speroff)
3. Risks associated with hyperprolactinemia (Speroff)
4. Congenital adrenal hyperplasia management (Speroff)
5. Gonadotropin-releasing hormone agonist therapy (Speroff)
6. Management of hydrosalpinx discovered on hysterosalpingography (ACOG PB No. 195)
7. Risks associated with congenital urogenital anomalies (ACOG CO No. 728)
8. Infertility evaluation (ACOG CO No. 781)

Review session format:

10:00-10:15: Answer and grade questions on your own, review algorithms

10:10-10:15: Turn on your camera when finished and enter 3 questions or topics that you would like to review in the chat

10:15-11:00: Group question or topic review

1. Which of the following medications is associated with hyperprolactinemia?

1. citalopram
2. fluoxetine
3. risperidone
4. quetiapine

Medications that cause hyperprolactinemia (prolactin concentration usually <100 ng/mL) interfere with hypothalamic dopamine production or action or affect the regulation of dopamine secretion by CNS neurotransmitters (e.g., serotonin). 429 430 The medications that most commonly cause hyperprolactinemia are dopamine D 2 receptor antagonists, such as typical antipsychotic drugs (phenothiazines, thioxanthenes, and butyrophenones), some atypical antipsychotic agents (e.g., risperidone, molindone), and gastrointestinal promotility agents (e.g., metoclopramide, domperidone). In contrast, newer atypical antipsychotic medications such as clozapine, olanzapine, quetiapine, ziprasidone, and aripiprazole much less commonly increase prolactin. Other medications that cause hyperprolactinemia less commonly include some tricyclic antidepressants (e.g., clomipramine), monoamine oxidase inhibitors (e.g., pargyline; clorgiline, which is rarely used), and antihypertensive agents (verapamil; α-methyldopa and reserpine, which are rarely used). Selective serotonin and serotonin/norepinephrine reuptake inhibitors in general have minimal to no effect on prolactin concentrations.

2. Which of the following is a consequence of hyperprolactinemia?

1. osteopenia
2. mastalgia
3. endometrial polyps
4. lactation failure

Both large and small PRL-secreting tumors can present with signs and symptoms of hyperprolactinemia. Menstrual irregularities, sexual dysfunction, galactorrhea, 257 osteopenia, 258 and impaired quality of life 259 are attributable to elevated PRL levels and presence of a tumor. Elevated PRL causes sexual dysfunction via a short loop feedback effect on gonadotrophin pulsatility, presumably inhibiting GnRH 260 and LH pulse frequency and amplitude. High PRL also directly inhibits ovarian and testicular function. Women with prolactinomas may present with primary or secondary amenorrhea, oligomenorrhea, menorrhagia, delayed menarche, or regular menses with a short luteal phase that may cause infertility. Patients may also report changes in libido and vaginal dryness

3. Which of the following is the next best step when evaluating a mildly elevated prolactin level (20-40 ng/ml)?

1. pituitary MRI
2. growth hormone level
3. formal visual field testing
4. repeat prolactin level

To avoid otherwise unnecessary and costly imaging, mildly elevated prolactin levels (20–40 ng/mL) are best repeated and confirmed before the diagnosis of hyperprolactinemia is made. Circulating prolactin levels are fairly stable throughout the day but can increase transiently during sleep, and with exercise, breast stimulation, and meals.

When there is no clear explanation for hypogonadotropic hypogonadism (e.g.,

absence of significant physical, nutritional, or emotional stress) or for persistent

hyperprolactinemia (e.g., use of medications), further evaluation with imaging is

indicated to exclude intracranial tumors and to help distinguish between pituitary

and hypothalamic causes. The method of choice for imaging of the hypothalamic and

pituitary regions is an MRI (with gadolinium contrast); brain MRI with contrast is more

sensitive and accurate than other imaging techniques for the detection of abnormalities

within and near the sella turcica.65 Pituitary MRI can demonstrate the nearby optic

chiasm, differentiate between hemorrhage and vascular abnormalities, and distinguish

these from other sellar mass lesions.

Pregnant women with large tumors and those with extrasellar extension who have stopped bromocriptine are at risk for tumor growth, and formal visual field testing should be done in each trimester. Just like in microprolactinomas, it is not necessary to measure serum prolactin levels throughout pregnancy, because levels do not uniformly increase during gestation and do not correlate with tumor enlargement.

PRL is also elevated in up to 50% of patients with acromegaly.  266 Patients in the early stages of acromegaly or with mild disease or patients harboring acidophilic stem cell adenomas may have few obvious signs of GH excess. Because the human GH molecule has lactogenic properties similar to those of PRL,  267 signs and symptoms of a prolactinoma may be mimicked by a purely GH-secreting tumor, and serum IGF1 should be measured. Elevated PRL levels are occasionally encountered in patients with TSH-secreting tumors. Other pituitary hormone functions should be ascertained to determine the presence of hypopituitarism. An MRI is required to establish a definitive diagnosis of prolactinoma.

4. Which of the following is the most likely menstrual disturbance associated with a mildly elevated prolactin level?

1. amenorrhea
2. oligomenorrhea
3. short luteal phase

Hyperprolactinemia commonly results in menstrual disturbances and is the cause of

secondary amenorrhea in up to 30% of women.313 The mechanism relates to inhibition

of hypothalamic GnRH secretion, which, in turn, results in decreased pituitary

gonadotropin secretion and in anovulation or a more severe hypogonadotropic

hypogonadism, depending on the level of hyperprolactinemia and the extent to which

gonadotropin secretion is suppressed. Chronic hypogonadism in a reproductive-age

woman may result in progressive bone loss that improves after prolactin levels get

normalized and functioning of the HPO axis is restored, but bone mineral density does

not always return to normal.314 Hyperprolactinemia also may result in galactorrhea, but

most hyperprolactinemic women do not have galactorrhea, primarily because their

estrogen levels are abnormally low. Although prolactinomas are much more common in

adults, they can cause growth failure and primary amenorrhea in children.315

Postmenopausal women with prolactinomas do not exhibit the classical symptoms and

often are recognized only when a large tumor causes neurologic symptoms.

5. Which of the following the best recommendation for patient with a microadenoma who conceives while on bromocriptine?

1. monitor prolactin levels and adjust therapy accordingly
2. stop bromocriptine after the first trimester
3. stop bromocriptine with a positive pregnancy test
4. switch bromocriptine to cabergoline

Not surprisingly, given the effectiveness of dopamine agonist treatment in restoring

ovulation and fertility in women with hyperprolactinemia, many women with functional

lactotroph adenomas become pregnant. Overall, approximately 80% of

hyperprolactinemic women, with or without adenomas, achieve pregnancy with

dopamine agonist treatment.332,333,334 Understandably, because the normal pituitary gland

approximately doubles in size by the third trimester of pregnancy335 and estrogen levels

are quite elevated throughout, there is some increase in the risk for tumor growth during

pregnancy. The risk for clinically significant growth in women with microadenomas is

extremely low—only approximately 1–2%.336 About 5% will develop asymptomatic

tumor enlargement (as determined by imaging), and essentially none will ever require

surgical intervention. The risk is significantly higher (approximately 15–20%) in those

with macroadenomas.333,336 Nevertheless, serial prolactin measurements during

pregnancy are unnecessary.

Regardless of the size of the adenoma, there is no indication for treatment with

dopamine agonists or for imaging during pregnancy in the absence of symptoms;

treatment may be safely discontinued when pregnancy is established

6. Which of the following is a risk factor for ovarian hyperstimulation syndrome?

1. polycystic ovary syndrome
2. leuprolide trigger
3. diminished ovarian reserve
4. GnRH antagonist protocol

Risk factors for OHSS include young age, low body weight, high ovarian

reserve as indicated by high serum AMH levels or antral follicle count, PCOS,

higher doses of gonadotropins, and previous episodes of

hyperstimulation.333,404,405,406,407,408,409,410,411 Risk increases with serum estradiol

levels and the number of developing ovarian follicles and when supplemental doses

of hCG are administered after ovulation for luteal phase support.412,413,414 OHSS

has been classified as mild, moderate, severe, or critical but is perhaps best viewed as

a continuum with a widely varying number and severity of symptoms.415

7. Which of the findings would warrant hospitalization for careful monitoring and aggressive treatment in a patient diagnosed with OHSS?

1. weight gain of 4 lbs
2. sodium <135 mEq/L
3. hematocrit <35%
4. creatinine <1.0 mg/dl

Serious illness is uncommon but not rare, having an incidence of approximately 1%.

Characteristic features include severe pain, rapid weight gain, tense ascites,

hemodynamic instability, respiratory difficulty, progressive oliguria, and laboratory

abnormalities. Hypotension can result from vascular volume depletion, oliguria from

reduced renal perfusion due to low vascular volume or tense ascites, and dyspnea from

ascites or hydrothorax. Hemoconcentration, reduced peripheral perfusion, and inactivity

increase the risk of thromboembolism. Renal failure, adult respiratory distress

syndrome, hemorrhage from ovarian rupture, and thromboembolic phenomena are

potential life-threatening complications of OHSS.418,419,420,421

Hospitalization for more careful monitoring and aggressive treatment warrants

serious consideration in women with severe abdominal pain or peritoneal signs,

intractable nausea and vomiting, severe oliguria, tense ascites, dyspnea or

tachypnea, dizziness or syncope, severe hyponatremia (sodium < 135 mEq/L) or

hyperkalemia (potassium > 5 mEq/L), hemoconcentration (hematocrit > 55%), or

abnormal renal functions (serum creatinine > 1.2 mg/dL; creatinine clearance < 50

mL/min) or abnormal liver functions (elevated transaminases).283,415,416,419,420

Recommended inpatient care for hospitalized women includes frequent evaluation

of vital signs, daily weights, measurements of abdominal circumference and fluid intake

and output, chest x-ray and echocardiogram when pleural or pericardial effusion is

suspected, pulse oximetry for those with pulmonary symptoms, and serial hematocrits,

electrolytes, and renal and liver function studies.416 Intravenous fluid management must

restore an effective plasma volume but not contribute unnecessarily to the accumulation

of extravascular fluid. After initial rehydration, fluids should be administered

judiciously in the lowest volumes necessary to maintain adequate urine output and

relieve hemoconcentration; because of the tendency to develop hyponatremia, saline is

preferable to lactated Ringer solution. When saline fails, slow infusions (over 4 hours) of albumin (25%; 50–100 g at 4–12 hours intervals) can effectively expand plasma

volume.422 Premature or excessive use of diuretics is counterproductive and should be

avoided as they cause further volume depletion. Intravenous fluid support can be

reduced substantially after diuresis begins and oral intake is reestablished.

Hyperkalemia may require specific treatment to move potassium into the intracellular

space (insulin/glucose, sodium bicarbonate) or to prevent cardiac dysrhythmias

(calcium gluconate).

Ultrasound-guided transabdominal or transvaginal paracentesis can be very helpful

in women with painful ascites, pulmonary symptoms, or oliguria that does not respond

to fluid management.421,423,424,425,426 In rare women with persistent bilateral or severe

pleural effusions, thoracentesis also may be required to relieve pulmonary symptoms.427

Full-length venous support stockings are recommended, and prophylactic

anticoagulation is warranted in cases of severe OHSS and should be continued at least

until the end of the first trimester in case of pregnancy.428,429 When symptoms prevent

ambulation, the use of an intermittent pneumatic compression device can help to reduce

the risk of thrombosis. Clinical signs and symptoms suggesting thromboembolism

demand prompt additional diagnostic measures and therapeutic anticoagulation when the

diagnosis is confirmed or strongly suspected.

In critical cases of OHSS, intensive care may be required for management of

thromboembolism, renal failure, or deteriorating pulmonary function. Women with

severe hyperstimulation and ovarian torsion or a ruptured ovarian cyst with hemorrhage

who require surgical management present a challenge to anesthesiologists who are

understandably seldom familiar with the pathophysiology of OHSS.

8. Which of the following is the appropriate management of a patient with congenital adrenal hyperplasia to prevent virilization of the fetus?

1. start dexamethasone with a positive pregnancy test
2. start hydrocortisone with a positive pregnancy test
3. perform a CVS with genotyping and sex determination

If risk elimination through the use of IVF with PGD is not a feasible option, maternal

supplementation with glucocorticoids that can reach the fetal circulation by crossing the

placenta (such as dexamethasone) has been utilized as a strategy to reduce the risk of

ambiguous genitalia in a CAH-affected female fetus.18,60,148,149,150 The premise of this approach is based on assumptions that (1) the conceptus is homozygous for the mutant gene (CYP21 being the commonest) and (2) is a genetic female. Among women

diagnosed with nonclassic CAH, the probability of conceiving an affected child is much

higher than in the general population. Assuming a population prevalence of

heterozygosity for severe CYP21A2 mutations at 1:60 and assuming that almost ½ of the

women with the nonclassic CAH are actually compound heterozygotes (carrying a

combination of one severe and one mild), the likelihood of women with nonclassic

CAH for having a CAH-affected child is calculated at 1:480, which is dramatically

higher than the risk in the general population (1:12,000–1:23,000 or even higher).13,142

In an affected fetus, the specific steroidogenic enzyme deficiency (21-hydroxylase being

the commonest) causes a reduction in fetal cortisol production, which in turn results in

an up-regulation in fetal ACTH production through suppression of negative feedback

(see Figure 13.2). The resulting high levels of fetal ACTH strive to stimulate the

steroidogenic pathway in attempts to achieve normal cortisol levels; this perpetual

stimulation of the steroidogenic pathway results in shunting of steroid precursors proximal to the enzymatic block toward androgen production (Figure 13.3), resulting in

hyperandrogenemia within the fetal compartment. The role of androgens in the

development of normal and abnormal sexual development is discussed in Chapter 8.

Given that it is cortisol deficiency that serves as the prime mechanism for HPA axis

overdrive in pregnancies affected by CAH, by increasing fetal cortisol levels through

maternal supplementation with a glucocorticoid that can cross the placenta without

being metabolized (such as dexamethasone-DEX), down-regulation of fetal ACTH and

thereby normalization of fetal androgen levels are achievable. Proponents of this

approach recommend utilization of this approach from earliest knowledge of pregnancy

(by 6 weeks at the latest) until the fetal gender can be determined using prenatal genetic screening (discussed in detail in Chapter 31).151,152,153,154,155,156 Maternal

supplementation can be safely discontinued for male fetuses as high androgen levels

confer no risk of deformity of male external genitalia. If the affected fetus is genetically

female, maternal supplementation within the first 8–12 weeks of gestation, when the

external genitalia are differentiating, can reduce the risk as well as magnitude of

virilization and thereby, future need for reconstructive surgery. Using a similar

rationale, maternal use of corticosteroids through the course of pregnancy is described

as a strategy to prevent fetal virilization. Available data on maternal glucocorticoid use

to prevent fetal virilization thus far are entirely observational and comparative, and in

recent years, the practice of maternal supplementation with corticosteroids has been

placed in question, particularly given the lack of long-term safety data. Consensus by a

number of professional societies including the Endocrine Society is that maternal

supplementation with corticosteroids for fetal benefit be considered experimental,

studies be conducted under purview of institutional review boards, and long-term

surveillance of in utero steroid-treated children be prioritized.18 Prenatal utilization of

corticosteroids for fetal benefit in cases of CAH represents an off-label use of this class

of drugs. Women with nonclassical CAH are deemed at a higher risk for spontaneous

miscarriage compared to unaffected population, and this risk may be lower in women

being treated with glucocorticoids in early pregnancy.18 Glucocorticoid therapy may

shorten time to pregnancy. Hydrocortisone and prednisone are preferred glucocorticoids for this indication as these get metabolized by placental 11β-hydroxysteroid dehydrogenase type 2, with minimal fetal exposure.

Treatment with long-acting glucocorticoids should be discontinued

in favor of treatment with hydrocortisone, which is metabolized by the placenta

and thereby avoids the risk of suppressing the fetal hypothalamic-pituitary-adrenal

axis. In general, term pregnancies, delivery of healthy female infants with normal

external genitalia, and normal growth and development in both girls and boys can be

achieved.180,269 Even when maternal androgen levels cannot be suppressed to normal, the high capacity of placental aromatase activity effectively protects the fetal female genitalia.180

9. Which of the following is the best initial treatment for hirsutism in a patient with congenital adrenal hyperplasia?

1. glucocorticoids
2. metformin
3. spironolactone
4. oral contraceptive pills

Glucocorticoids are used to suppress endogenous ACTH secretion in the long-term

management of women with classical CAH. They also have been used for the treatment

of hirsutism in women with the nonclassical, late-onset form of the disorder, with

varying benefit. Although glucocorticoids suppress serum adrenal androgen levels

effectively in women with nonclassical CAH, they are less effective than oral

contraceptives or antiandrogens for the treatment of hirsutism.201,202 Consequently,

glucocorticoid treatment has even less to offer women with other causes for

hirsutism.

1. Which of the following is a safe and effective treatment for a female patient with idiopathic gonadotropic-dependent precocious puberty?
   1. leuprolide
   2. letrozole
   3. tamoxifen
   4. estradiol

Long-acting GnRH agonists have proven both safe and effective for the treatment

of idiopathic gonadotropin-dependent precocious puberty.260,261,262,263,264,265,266,267

GnRH agonist treatment causes a brief initial “flare” of gonadotropin release, followed

by pituitary desensitization (exhaustion of available stores of releasable gonadotropins)

and down-regulation (decrease in GnRH receptors). By suppressing the pituitary gonadal

axis, GnRH agonist therapy can prevent progressive pubertal development, and

increase final adult height, compared to pretreatment predictions. Young children and

those who exhibit rapidly progressive development can be expected to have early epiphyseal fusion, are at greatest risk for compromised adult height, and can

benefit most from treatment.257

In girls under 6 years of age with idiopathic gonadotropin-dependent precocious

puberty, treatment with a GnRH agonist can be expected to add 9–10 cm to adult height. In older children already past their peak with slowing growth velocity, treatment can be expected to slow it further, to delay epiphyseal fusion, and to yield slow but steady increases in predicted adult height. In girls between 6 and 8 years of age, GnRH agonist treatment typically results in a gain of 4–7 cm in height, less if bone age is significantly advanced.257 Girls already close to the age of normal puberty, those with slowly progressive maturation, and girls with a predicted height above 150 cm have less to gain and may not benefit significantly from treatment.268,269,270

The choice among the available GnRH agonist formulations depends mostly on

physician preference and availability. Depot preparations generally are preferred

because of improved compliance. Direct comparisons in randomized trials have not

been made, but any of the following treatment regimens generally can be expected to

suppress the pituitary-gonadal axis271,272,273

Buserelin 6.3 mg every 2 months

Goserelin 3.6 mg every month or 9.8 mg every 3 months

Histrelin 50-mg implant every year

Leuprolide 3.75–7.5 mg monthly or 11.25 mg every 3 months

Triptorelin 3.0–3.75 mg monthly or 11.25 mg every 3 months

Treatment with GnRH agonists does not appear to have any significant longterm

adverse effects on function of the hypothalamic-pituitary-gonadal axis.278 It

can be continued until the epiphyses are fused or until the pubertal and chronologic

ages are appropriately matched. Prompt reactivation of the pituitary-gonadal axis

and pubertal development, in a pattern similar to that in normal adolescents,

generally follows the discontinuation of treatment.

1. Which of the following is an appropriate indication for GnRH agonist treatment for myomas?
   1. long-term resolution of myomas
   2. improved dissection at myomectomy
   3. improved anemia prior to myomectomy
   4. reduced length of hospital-stay after myomectomy

Summarizing the experience with GnRH agonist treatment of leiomyomas, the mean

uterine size decreases 30–64% after 3–6 months of treatment.262 Maximal response is

usually achieved by 3 months. Menorrhagia anemia, pelvic pressure, and urinary, frequency all respond favorably to GnRH agonist treatment.265,266 GnRHa treatment

results in a reduction in uterine and fibroid blood supply as measured by Doppler

ultrasound and microvascular density.267,268 A decrease in operative blood loss can be

achieved when the pretreatment uterus is as large as a 16-week pregnancy or larger.

However, some studies find no benefit in terms of surgical blood loss or length of

hospital stay, and surgical dissection may be more difficult because of softening of the

myoma.

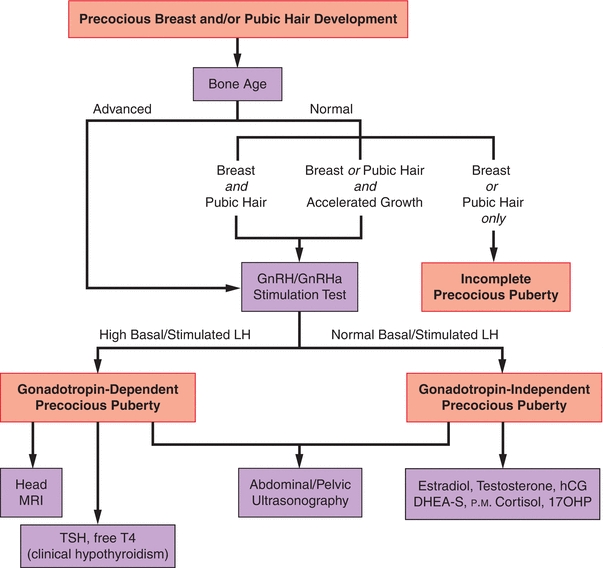
1. Which of the following is the appropriate therapy when a hydrosalpinx is found by hysterosalpingogram?
   1. ceftriaxone
   2. metronidazole
   3. doxycycline
   4. ceftriaxone and doxycycline

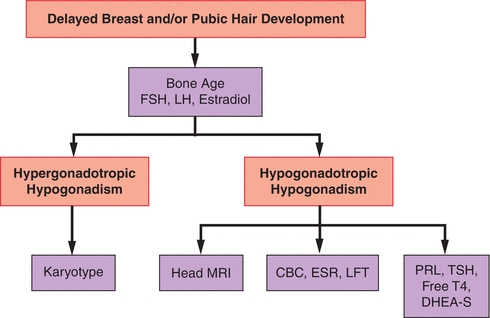
The risk of infection associated with HSG and chromotubation is related to the patient's history of PID. Antimicrobial prophylaxis is recommended for patients undergoing HSG or chromotubation if they have a history of PID or their fallopian tubes are noted to be abnormal at the time of the procedure.

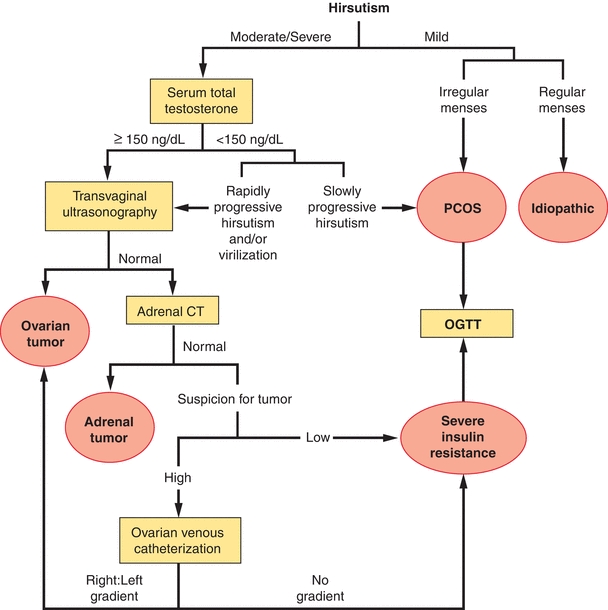
Pelvic inflammatory disease after HSG is an uncommon (1.4-3.4%) but potentially serious complication ([53, 54](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#231)). Patients with dilated fallopian tubes at the time of HSG have a higher rate (11%) of post-HSG PID ([53](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#231)). The possibility of lower genital tract chlamydial infection should be considered before performing this procedure. In a retrospective review, investigators observed no cases of post-HSG PID in patients with nondilated fallopian tubes (0/398) ([53](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#231)). In patients with no history of pelvic infection, HSG can be performed without prophylactic antibiotics. If HSG demonstrates dilated fallopian tubes, doxycycline, 100 mg twice daily for 5 days, is recommended to reduce the incidence of post-HSG PID ([53](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#231)). In patients with a history of pelvic infection, doxycycline can be administered before the procedure and continued if dilated fallopian tubes are found. Although there are no specific studies, because chromotubation at the time of diagnostic laparoscopy is in many ways similar to HSG, application of the same prophylaxis regimen is reasonable. In patients thought to have an active pelvic infection, neither HSG nor chromotubation should be performed.

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| 1. Which of the following screening tests should be performed in a sexually active 23-year-old patient with mullerian agenesis? 2. Pap test 3. HPV test 4. chlamydia 5. urinary analysis  |  | | --- | | Health care providers should be aware that some routine gynecology questions, including the date of last menstrual period, are unnecessary and may make patients have less confidence in the health care team. The patient should be asked about any vaginal discharge, bleeding, pelvic pain, or dyspareunia. Pelvic examinations should be performed if there are concerns about complications, vaginal stricture, or stenosis. If a patient is symptomatic, vaginal speculum examination and inspection should be performed to check for possible malignancy, colitis, ulceration, or other problems. Although vulvar and vaginal intraepithelial neoplasia are possible, routine cytology testing is not regularly recommended because of the lack of a cervix. However, if an abnormal lesion is identified, biopsy is warranted. Although the vagina may not appear typical postprimary dilation or surgery, appearance does not dictate function. |  |  | | --- | | Sexually active women with mullerian agenesis should be aware that they are at risk of sexually trans-mitted infections and, thus, condoms should be used for intercourse. Patients should be appropriately screened for sexually transmitted infections according to the guidelines for women without mullerian agenesis ([43](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#122)). Human papillomavirus vaccination of girls and young women is recommended because it may decrease the risk of vulvar and vaginal neoplasia and genital warts ([44, 45](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#123)). Finally, patients should be given a written medical summary of their condition, including a summary of concomitant malformations. This information may be useful if the patient requires urgent medical care or emergency surgery by a health care provider unfamiliar with mullerian agenesis. |   Evaluation for associated congenital anomalies is essential because up to 53% of patients with mullerian agenesis have concomitant congenital malformations, especially of the urinary tract and skeleton ([12](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#91)). Multiple studies have confirmed the prevalence of renal anomalies in patients with mullerian agenesis to be 27-29%; therefore, ultrasound evaluation of the kidneys is warranted for all patients ([13, 14](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#92)). Skeletal anomalies (eg, scoliosis, vertebral arch disturbances, hypoplasia of the wrist) have been reported in approximately 8-32% of patients; therefore, spine radiography (X-ray) may reveal a skeletal anomaly even in asymptomatic patients ([12-14](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#91)). There is an increased, but small, rate of hearing impairment in patients with mullerian agenesis ([12](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#91)). A variety of uterine anomalies, including mullerian agenesis, can be seen with VATER/VACTERL association (vertebral anomalies, anorectal malformations, cardiovascular anomalies, tracheoesophageal fistula, esophageal atresia, renal anomalies, limb defects) ([15](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#94)).  14. A 25-year-old nulligravid woman would like to conceive with her male partner. She has a history of treatment of stage IV endometriosis and recently stopped continuous combination oral contraceptive pills. They have been trying to conceive for 2 months. Which of the following is the most appropriate next step?   * 1. return in 10 months for an infertility evaluation   2. return in 4 months for an infertility evaluation   3. immediate infertility evaluation   4. immediate infertility treatment  |  |  |  | | --- | --- | --- | | *Infertility*, defined as failure to achieve pregnancy within 12 months of unprotected intercourse or therapeutic donor insemination in women younger than 35 years or within 6 months in women older than 35 years, ([1, 2](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#138)) affects up to 15% of couples ([3](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#140)). It is common for an infertile woman initially to seek care from her obstetrician-gynecologist. The basic infertility evaluation is summarized in [Table 1](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#TT1). An infertility evaluation may be offered to any patient who by definition has infertility or is at high risk of infertility. Women older than 35 years should receive an expedited evaluation and undergo treatment after 6 months of failed attempts to become pregnant or earlier, if clinically indicated. In women older than 40 years, more immediate evaluation and treatment are warranted ([4](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#141)). Additionally, if a woman has a condition known to cause infertility, the obstetrician-gynecologist should offer immediate evaluation ([1](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#138)). Indications for immediate evaluation include the following: | |  | | --- | |  | |  |  | | --- | | \* oligomenorrhea or amenorrhea |  |  | | --- | | \* known or suspected uterine, tubal, or peritoneal disease |  |  | | --- | | \* stage III or stage IV endometriosis and |  |  | | --- | | \* known or suspected male infertility |   Cover  15. A 36-year-old nulligravid woman would like to conceive with her male partner. They have been trying to conceive for 6 months. She has 28 day cycles and detects an LH surge on day 12. Her AMH level is 1.8 ng/ml. She completed a hysterosalpingo-contrast sonogram confirms tubal patency of at least one tube and a normal appearing uterine cavity. Her partner completed a semen analysis with the following parameters: volume 1.5 ml, sperm concentration 35 million per ml, total sperm concentration 52.5 million, total motility 55%, sperm morphology 5% normal forms. The most likely diagnosis is:   1. male factor 2. unilateral tubal factor 3. diminished ovarian reserve 4. unexplained infertility  |  | | --- | |  | |
| Pelvic inflammatory disease after HSG is an uncommon (1.4-3.4%) but potentially serious complication ([53, 54](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#231)). Patients with dilated fallopian tubes at the time of HSG have a higher rate (11%) of post-HSG PID ([53](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#231)). The possibility of lower genital tract chlamydial infection should be considered before performing this procedure. In a retrospective review, investigators observed no cases of post-HSG PID in patients with nondilated fallopian tubes (0/398) ([53](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#231)). In patients with no history of pelvic infection, HSG can be performed without prophylactic antibiotics. If HSG demonstrates dilated fallopian tubes, doxycycline, 100 mg twice daily for 5 days, is recommended to reduce the incidence of post-HSG PID ([53](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#231)). In patients with a history of pelvic infection, doxycycline can be administered before the procedure and continued if dilated fallopian tubes are found. Although there are no specific studies, because chromotubation at the time of diagnostic laparoscopy is in many ways similar to HSG, application of the same prophylaxis regimen is reasonable. In patients thought to have an active pelvic infection, neither HSG nor chromotubation should be performed.   1. Which of the following screening tests should be performed in a sexually active 23-year-old patient with mullerian agenesis? 2. Pap test 3. HPV test 4. Chlamydia 5. Urinary analysis  |  | | --- | | Health care providers should be aware that some routine gynecology questions, including the date of last menstrual period, are unnecessary and may make patients have less confidence in the health care team. The patient should be asked about any vaginal discharge, bleeding, pelvic pain, or dyspareunia. Pelvic examinations should be performed if there are concerns about complications, vaginal stricture, or stenosis. If a patient is symptomatic, vaginal speculum examination and inspection should be performed to check for possible malignancy, colitis, ulceration, or other problems. Although vulvar and vaginal intraepithelial neoplasia are possible, routine cytology testing is not regularly recommended because of the lack of a cervix. However, if an abnormal lesion is identified, biopsy is warranted. Although the vagina may not appear typical postprimary dilation or surgery, appearance does not dictate function. |  |  | | --- | | Sexually active women with mullerian agenesis should be aware that they are at risk of sexually trans-mitted infections and, thus, condoms should be used for intercourse. Patients should be appropriately screened for sexually transmitted infections according to the guidelines for women without mullerian agenesis ([43](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#122)). Human papillomavirus vaccination of girls and young women is recommended because it may decrease the risk of vulvar and vaginal neoplasia and genital warts ([44, 45](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#123)). Finally, patients should be given a written medical summary of their condition, including a summary of concomitant malformations. This information may be useful if the patient requires urgent medical care or emergency surgery by a health care provider unfamiliar with mullerian agenesis. |   Evaluation for associated congenital anomalies is essential because up to 53% of patients with mullerian agenesis have concomitant congenital malformations, especially of the urinary tract and skeleton ([12](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#91)). Multiple studies have confirmed the prevalence of renal anomalies in patients with mullerian agenesis to be 27-29%; therefore, ultrasound evaluation of the kidneys is warranted for all patients ([13, 14](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#92)). Skeletal anomalies (eg, scoliosis, vertebral arch disturbances, hypoplasia of the wrist) have been reported in approximately 8-32% of patients; therefore, spine radiography (X-ray) may reveal a skeletal anomaly even in asymptomatic patients ([12-14](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#91)). There is an increased, but small, rate of hearing impairment in patients with mullerian agenesis ([12](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#91)). A variety of uterine anomalies, including mullerian agenesis, can be seen with VATER/VACTERL association (vertebral anomalies, anorectal malformations, cardiovascular anomalies, tracheoesophageal fistula, esophageal atresia, renal anomalies, limb defects) ([15](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#94)).   1. A 25-year-old nulligravid woman would like to conceive with her male partner. She has a history of treatment of stage IV endometriosis and recently stopped continuous combination oral contraceptive pills. They have been trying to conceive for 2 months. Which of the following is the most appropriate next step?    1. Return in 10 months for an infertility evaluation    2. Return in 4 months for an infertility evaluation    3. Immediate infertility evaluation    4. Immediate infertility treatment  |  |  |  | | --- | --- | --- | | *Infertility*, defined as failure to achieve pregnancy within 12 months of unprotected intercourse or therapeutic donor insemination in women younger than 35 years or within 6 months in women older than 35 years, ([1, 2](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#138)) affects up to 15% of couples ([3](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#140)). It is common for an infertile woman initially to seek care from her obstetrician-gynecologist. The basic infertility evaluation is summarized in [Table 1](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#TT1). An infertility evaluation may be offered to any patient who by definition has infertility or is at high risk of infertility. Women older than 35 years should receive an expedited evaluation and undergo treatment after 6 months of failed attempts to become pregnant or earlier, if clinically indicated. In women older than 40 years, more immediate evaluation and treatment are warranted ([4](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#141)). Additionally, if a woman has a condition known to cause infertility, the obstetrician-gynecologist should offer immediate evaluation ([1](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#138)). Indications for immediate evaluation include the following: | |  | | --- | |  | |  |  | | --- | | \* oligomenorrhea or amenorrhea |  |  | | --- | | \* known or suspected uterine, tubal, or peritoneal disease |  |  | | --- | | \* stage III or stage IV endometriosis and |  |  | | --- | | \* known or suspected male infertility |   Cover   1. A 36 year-old nulligravid woman would like to conceive with her male partner. They have been trying to conceive for 6 months. She has 28 day cycles and detects an LH surge on day 12. Her AMH level is 1.8 ng/ml. She completed a hysterosalpingo-contrast sonogram confirms tubal patency of at least one tube and a normal appearing uterine cavity. Her partner completed a semen analysis with the following parameters: volume 1.5 ml, sperm concentration 35 million per ml, total sperm concentration 52.5 million, total motility 55%, sperm morphology 5% normal forms. The most likely diagnosis is:    1. Male factor    2. Unilateral tubal factor    3. Diminished ovarian reserve    4. Unexplained infertility  |  | | --- | |  |  |  | | --- | | Unexplained infertility may be diagnosed in as many as 30% of infertile couples ([39](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#176)). Unexplained infertility occurs when the definition of infertility is met, the basic infertility evaluation is performed, and all the tests results are normal. At a minimum, these patients should have evidence of ovulation, tubal patency, and a normal semen analysis |  |  | | --- | | The reproductive potential of the ovaries, termed ovarian reserve, represents the number of oocytes available for potential fertilization at that point in time and may be assessed by serum tests or ultrasonography. The presence of decreased ovarian reserve predicts future response to ovarian stimulation ([8](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#145)). The results of ovarian reserve tests should be considered in the context of the patient's age. Although there are no definitive criteria for diminished ovarian reserve, the following values may be considered consistent with diminished ovarian reserve: |  |  | | --- | | \* antimullerian hormone (AMH) value less than 1 ng/mL |  |  | | --- | | \* antral follicle count less than 5-7 and |  |  | | --- | | \* follicle-stimulating hormone (FSH) greater than 10 IU/L or |  |  | | --- | | \* a history of poor response to in vitro fertilization stimulation (fewer than four oocytes at time of egg retrieval). |  |  | | --- | | Ovarian reserve can be assessed by measuring estradiol and FSH between cycle days 2-5. Follicle-stimulating hormone values greater than 10 IU/L are associated with a less robust response to ovarian stimulation ([9](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#146)). Estradiol serves as an aid for interpreting FSH results. Basal estradiol levels typically should be less than 60-80 pg/mL; elevated estradiol levels may have a suppressive effect on FSH levels and are indicative of decreased ovarian reserve ([3](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#140)). Serum AMH is produced by the granulosa cells of antral follicles and, therefore, is another serum marker of ovarian reserve. Because AMH levels remain relatively stable throughout the menstrual cycle, they can be assessed on any day of the menstrual cycle ([10, 11](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#147)).  Antimullerian hormone is similar to antral follicle count in its ability to predict response to ovarian stimulation and pregnancy in infertile women ([12](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#149)). Ovarian reserve tests are good predictors of response to ovarian stimulation, but poor results do not necessarily predict inability to achieve a live birth ([3, 13, 14](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#140)). If a woman has unexplained ovarian insufficiency or failure or an elevated FSH level before age 40 years, fragile X carrier screening is recommended to determine whether she has an *FMR1* premutation ([15](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#152)). |  |  | | --- | | Ultrasonographic assessment of the antral follicle count is determined by the number of follicles that measure 2-10 mm in both ovaries. *Low antral follicle count* may be defined as fewer than 5-7 follicles and is associated with poor response to ovarian stimulation ([16](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#153)). However, antral follicle count is a relatively poor predictor of future ability to become pregnant. Antral follicle counts may be elevated in women with polycystic ovary syndrome (PCOS) or depressed in those women with hypothalamic amenorrhea or those using certain hormonal contraceptives ([17](https://ovidsp-dc2-ovid-com.ezp.lib.rochester.edu/ovid-b/ovidweb.cgi?QS2=#154)). | |

Other algorithms (from Speroff’s textbook) that you should understand prior to the CREOG:







Amenorrhea evaluation

