MODULE 3, CHAPTER 1

00:00:28

Module 3, infertility screening.

00:05

The objectives of Module 3 will be to understand the general procedure for evaluating a patient with infertility, including medical history and physical exam, diagnostic testing including ovarian reserve and imaging and male fertility evaluation. We'll also examine the possible anatomical causes of female infertility and discuss the role of genetic evaluation.

00:31

We will start with introduction to infertility investigations.

00:37

The factors affecting fertility will be, as you can see on the left hand side in the female witch or on the right hand side, what you see listed for male or sperm provider. And, in the middle of this Venn diagram, looking at the factors that will affect both male and female, such as genetic or lifestyle factors.

01:07

For initial infertility evaluation starts with medical history, a physical exam which is clinic specific, as we will discuss later, laboratory testing to examine the functioning of the reproductive system and determine the presence of any systemic or hormonal disorders, visualization procedures such as X-ray and ultrasound and then semen analysis to measure semen volume, sperm concentration, mobility and morphology.

01:42

Let's look at female infertility evaluation, starting with medical history.

01:50

There are essential components of infertility history, which include ag, very important, menstrual history, a gynecological history, including sexually transmitted infections, obstetrical history, current medical conditions, recent travel history, exposure to Zika, virus medications, lifestyle factors, occupation and environmental toxin exposure, any family history, including potential for genetic abnormality, and also the possibility of third party reproduction where indicated.

02:31

Age definitely determines the timing of fertility workup, as has been discussed previously, for a woman who is less than 35 after 12 months of attempting conception in the absence of other reasons to suspect difficulty with conception or 35 or younger or sorry, 35 or older, after 6 months of attempting conception, in the absence of other reasons to suspect difficulty with conception. For women who are present in their mid to late 40s is extremely unlikely to achieve a healthy live birth unless egg donation is used.

03:11

We look at the age of the oocyte provider, the female and chromosome chromosomal abnormalities we will see that the chance of life birth dramatically decreases as a woman ages, particularly after 40 and the chance of miscarriage and aneuploidy or chromosomal disorders increase.

03:33

Menstrual history is a critical factor in taking history when looking at infertility, the age of menarche or the beginning of menstrual cycles, cycle length and duration, also the regularity and predictability of the cycle and the presence or absence of premenstrual syndromes, symptoms or other or painful periods, heavy periods, intermenstrual bleeding or post-coital bleeding.

Symptoms that could possibly be associated with pathological conditions are menorrhagia heavy and prolonged period, which may indicate something like fibroids or metrorrhagia, which is irregular bleeding, or can also happen between periods, which may suggest anovulatory disorder.

04:29

The history of sexually transmitted infections are important to rule out factors that may result in a tubal issue. Sexual history, looking at the timing of pregnancy attempts, timing of intercourse, home insemination has already been used, or if other assisted reproductive technologies have been used in the patient's history, duration of attempt to conceive and if there is menstrual pain, could be included in that.

Many patients will come having already tested ovulation in order to identify if they are ovulating, LH strips or sometimes used to detect an LH surge, which are similar to urine pregnancy test, using a little stick and an indicator not to commonly, but you may see them in practice, basal body temperature charts or sometimes used to track ovulation or look for evidence of ovulation.

But more commonly now, people are turning to cycle tracking and fertility apps as a method of gathering this information. Here's just an example of a basal body temperature graph, and some patients will come with these for their consult visit. And you'll see there's a little dip in the graph, which is indicates that ovulation is about to occur and an increase during the time of ovulation or it's more predictive of ovulation.

06:11

Obstetrical history is important to determine the history of pregnancies, previous partners, for example, delivery method and any complications, the time it took to conceive, the method of conception. If there's a history of ectopic pregnancies or any spontaneous abortions or elective terminations of pregnancy, any complications in pregnancy and how delivery occurred, it was a natural birth or caesarean.

Complications suggested a suggestive of endocrine disturbances or pelvic infections, such as if in pregnancy there was gestational diabetes, which may be suggestive of PCOS, or if there were any post-partum fevers or curettage which could result in tubal damage or the development of intrauterine scarring. Or any previous treatment.

07:16 Physical exam and workup.

07:19

Physical exam for female includes BMI to look at if there if someone is quite overweight or underweight, it may interfere with ovulation, skin examination, which might sound a little strange when you're investigating fertility. However, if acanthosis nigricans, which is a darkening of pigmentation in the axilla or at the base of the neck.

It may indicate insulin resistance or PCOS, as does hirsutism or male pattern alopecia or acne, which is suggestive of a hyperandrogenic state, which you would see in PCOS. Breast exam which is also clinic specific and may not be done during an infertility consultation. However, if there was a discharge, galactorrhea, it may be suggestive of prolactinemia. And also, as with breast exams, pelvic exam is clinic specific as it might have already been done prior to a fertility consultation.

But if there was any evidence of hyperandrogenism like clitoromegaly or if there were any congenital defects or any disorders identified uterus, ovaries or fallopian tube. Also not commonly, but we may see female genital mutilation, which could interfere with fertility.

08:56

For serum work up it varies according to the patient's history, but these are common things that will be done, blood type and screen, viral serology. But most commonly, we see day 3 FSH and estradiol, antimüllerian hormone and endocrine panel, including thyroid and LH also ultrasound with antral follicle count is a common assessment, as is if there are any genetic concerns, carrier testing and karyotype.

And these tests are commonly done, progesterone, prolactin, testosterone and fasting glucose, and if we're looking at third party reproduction, there are tests that need to be done to rule out infectious diseases.

10:02

So female infertility evaluation, evaluation of ovarian reserve.

10:10

So as a result of delayed parenting, which is a growing trend in Canada, there is the probability of age related for infertility in women, which is also increased. A growing number of women are seeking fertility specialists to learn their options to overcome age related fertility. And their options include conceiving at a younger age, donor sperm insemination for women who are wanting to become single parents, donor egg or embryos and cryopreservation of oocytes, which is used more commonly in current treatment. Oocytes are cryopreserved using vitrification, which is a technique for freezing eggs using high doses sorry, high concentrations of cryoprotectant and an ultra rapid-cooling which may yield fewer blastocysts and fresh sites but has been done very successfully.

11:19

So, the SOJC, which is a Society of Obstetricians and Gynecologists of Canada, has recommendations on ovarian reserve testing. The recommendations include considering to do ovarian reserve testing in women who are 35 years of age or older or in women who are younger than 35 with risk factors for decreased ovarian reserve, such as having a single ovary, a previous ovarian surgery. If they've had a previous poor response to FSH that is stimulation with gonadotropin or have had exposure to chemotherapy or radiation, or they are in the population of unexplained infertility. What they do state also in the recommendations is that ovarian reserve testing prior to reproductive treatment, assisted reproductive technologies should be

used for counseling only. In other words, not for gatekeeping to exclude women from treatment who may not have a favorable result that may affect clinic statistics, for example.

12:33

So, the tests that are used for ovarian reserve are typically basal FSH levels, basal antral follicle count or anti-müllerian hormone, AMH.

12:52

And this is an ultrasound image of an antral follicle count. We saw a similar image for PCOS but you can see here there's a lesser number of follicles. So 5 or more would be determined as a favorable for a woman who would be undergoing gonadotropin treatment.

13:17

So if we compare FSH and AMH testing, we you will see AMH used as a more frequent marker of ovarian reserve and that is because it's a more informative marker and has less cycle to cycle variability than FSH. Also, AMH can be done on any day in the menstrual cycle where FSH has to be timed for cycle day 2 to 4 only and also FSH requires a companion test of estradiol while at the same time and basal FSH does not detect high ovarian reserve as does AMH, which can be used to indicate if someone is susceptible to hyper stimulation, which we will discuss in a later module.

14:14

Our next section will look at the evaluation of ovulation and cervical function.

14:23

Evaluation of ovulation and luteal phase. Ovulation can be evaluated through the use of urine LH kits and over the counter ovulation kits, also online ovulation calculator and apps are used probably much more frequently to pinpoint fertility cycle and the best time to conceive. In other words, the best time to have intercourse.

When LH kits are used for home testing, they start early in the cycle and LH is negative and after daily testing will turn positive to indicate that ovulation will occur.

The luteal phase, which occurs after ovulation, the average length is 12 to 14 days, although can vary, the mid-luteal serum progesterone, it would be a day 21. Most commonly serum progesterone can be used to identify if ovulation has occurred. Also not used frequently, but also can identify if ovulation has occurred is endometrial biopsy, which if there is a secretary endometrium, it can confirm ovulation. And if the luteal phase deficiency, it is identified, it means there's inadequate progesterone level to maintain the endometrium.

15:53 Imaging procedures.

15:57

Imaging procedures to investigate female infertility can be indirect, including sonohysterogram, hysterosalpingogram or direct, which is a direct visualization through hysteroscopy or laparoscopy.

16:16

The sonogram is instillation, sorry, a sonohysterogram is an installation of saline during a sonogram visualization of the endometrial cavity. It improves detection of intrauterine defects compared with just normal sonogram or ultrasound and these would be including fibroids or larger polyps.

A hysterosalpingo-contrast sonogram is comparable to hysterosalpingogram for uterine and tubule investigation, and it involves the transvaginal ultrasound, assessment of the uterus using saline and also it shows fallopian tube or pregnancy using a contrast agent of galactose micro bubbles. The advantage here is it avoids exposure to x-ray and the contrast media used in HSG.

17:22

Here we see a diagram of a hysterosalpingogram, HSG, where dye is injected through the cervix into the uterus and under x-ray visualizations, observation of how the dye moves through the fallopian tubes or doesn't, as you'll see on the right hand side, which indicates there is a tubal blockage.

17:48

Hysteroscopy as you see in this sagittal view is a direct visualization of uterine cavity and is used to identify fibroids or polyps, and in the case of smaller polyps, these can actually be removed under hysteroscopy.

18:11

Laparoscopy is used to be the gold standard for fertility investigation, but due to other available methods of visualization and the difficulty accessing OR time is not used as frequently. However, in some cases it is necessary for a complete diagnosis of, for example, say and endometriosis but also under laparoscopy, there can be a surgical correction and removal of pelvic pathology.

The disadvantages are it is an invasive procedure that requires general anesthesia is definitely a higher cost to the medical system. And there's a longer post procedural pain and recovery as opposed to, say, a sonohysterogram.

19:07

And in these investigations, we've seen this diagram before, but this is something that could be a finding during these investigations.

19:19

So in summary, female infertility evaluation is detailed medical history is of critical importance in the initial evaluation of infertility, noting that age is a primary factor determining a woman's fertility. Ovarian reserve testing should be considered in women who are over 35 years and in younger women, if there are risk factors for decreased ovarian reserve. Basal FSH levels and antral follicle counts are common tests, although AMH levels correlate well with follicle number and response to controlled ovarian stimulation.

There are a number of indirect imaging procedures that are used to evaluate uterine structure and tubal patency.

20:06

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