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Ambiguous Genitalia

Developed by Terra Morel and Dr. Elizabeth Rosolowsky for PedsCases.com.
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Introduction

Hello, and welcome to this PedsCases podcast on an approach to ambiguous genitalia in the newborn. My name is Terra Morel and I am a third year medical student at the University of Alberta. This podcast was created in collaboration with Dr. Elizabeth Rosolowsky, a pediatric endocrinologist at the University of Alberta.

Disorders of Sex Development, or DSD, are a group of congenital conditions, in which development of chromosomal, gonadal or phenotypic sex is atypical. The term DSD has replaced intersex and hermaphrodite in the lexicon (4). Sometimes you'll hear DSDs referred to as differences of sexual development. Ambiguous genitalia is a subclass of DSD.

Learning Objectives

This podcast aims to provide an approach to a first presentation of ambiguous genitalia. By the end of this podcast, you should be able to:

1. Describe the typical sequence of sexual determination and differentiation
2. Define disorder (or difference) of sex development and ambiguous genitalia
3. Generate a differential diagnosis for ambiguous genitalia, and identify 21-hydroxylase CAH as the most common cause
4. Outline the initial approach and management of an infant born with ambiguous genitalia

Case

Let's start with a case.

You are on your pediatrics rotation, and are called to assess a 1 hour old newborn. Upon entering the room, mom is resting comfortably with the baby asleep against her chest, and dad is sitting in a chair next to the bed. You introduce yourself and congratulate the parents. The mom explains to you that no one has been able to tell them if their baby is a boy or a girl because the genitalia don't look exclusively male or female. Both parents appear very concerned. What do you do?

In order to understand what is going on here, let's begin by discussing the typical process of sex development.

Typical sexual determination and differentiation

Under typical circumstances, an undifferentiated embryo develops into a fetus with gonads, internal genitalia and external genitalia that are either male or female. This process begins at fertilization and continues until around 20 weeks gestational age.

Sex development is a stepwise process. We can think of sex in 4 major ways: chromosomal sex; gonadal sex; hormonal sex; and phenotypic sex.

First, chromosomal sex is established at fertilization and is determined by the chromosomal constitution. The typical male chromosomal sex is 46XY, and female is 46XX (1).

Until 6 weeks gestational age the fetus has undifferentiated gonads that are identical between XY and XX individuals. The gonads at this stage are called "bipotential gonads" because they have the potential to develop into either testes or ovaries (1).

Then at 6 weeks gestational age things begin to change. The chromosomal constitution drives the bipotential gonads to become either testes or ovaries. The Y-chromosome contains an important gene called the SRY -- the Sex-determining Region of the Y chromosome. If SRY is present, the bipotential gonad is directed to become a testicle. This is a very important step called sex determination. The Gonadal Sex is determined. Now, it used to be said that the female pathway was the "default" pathway, in other words, if no SRY was present, then the gonad would develop into an ovary. We now know that this is no longer the case -- there are also important genes that regulate ovarian development, but this is beyond the scope of this podcast. Just remember that the bipotential gonad needs SRY on the Y chromosome to become a testicle. If testes are established a male reproductive tract will develop; if testes are not established a female reproductive tract will develop (1).

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How does this happen?

Well, after sex determination is complete, the process of sex differentiation is next.
In sex differentiation, the hormonal sex of the fetus is determined in response to its gonadal sex, and this helps decide the final phenotypic sex.

Let's break this process down, and start by discussing male fetal development.

Testes are composed of Leydig and Sertoli cells. Leydig cells secrete testosterone. Sertoli cells secrete anti-Mullerian hormone. These hormones have distinct and important roles.

Remember how the fetus starts off with bipotential gonads? Well, the fetus also possesses 2 sets of internal ducts: the Wolffian ducts (also known as the mesonephric ducts) and the Mullerian ducts (also known as the paramesonephric ducts). Wait, there's more! The fetus also has bipotential external structures that can give rise to either male-appearing or female-appearing genitals.

If the hormonal sex is male:

- Testosterone causes the Wolffian ducts to develop into male internal genitalia, including the epididymis, vas deferens, seminal vesicle, and the prostate.
- Anti-Mullerian Hormone causes the regression of the Mullerian ducts (1).
- Testosterone is conjugated into an even more potent hormone called dihydrotestosterone, or DHT for short. DHT causes the formation of male external genitalia, including the glans penis and the scrotum.

So, if testes are present, male hormones are produced, and this causes male internal and external genitalia to form.

What happens when testes are absent?
Well, in that case testosterone, DHT and anti-Mullerian hormone are not present.

- In the absence of testosterone, the Wolffian ducts regress, which prevents the formation of male internal genitalia.
- In the absence of anti-Mullerian hormone, the Mullerian ducts remain, giving rise to female internal genitalia, including the uterus, fallopian tubes, and upper one third of the vagina (1).
- In the absence of DHT, female external genitalia forms, including the clitoris, labia majora, labia minora, vaginal orifice, and lower two thirds of the vagina.

So, when testes are absent, male hormones are absent, and so female internal and external genitalia form.

So as you can see there are four important steps in the process of sex development: first is the establishment of chromosomal sex at fertilization; the chromosomal sex then drives the bipotential gonad to develop into either testes or ovaries; testes will produce male sex hormones, ovaries will not; male sex hormones will cause a male phenotype to develop, without male sex hormones a female phenotype will develop. In sum, the process goes: chromosomal sex - gonadal sex - hormonal sex - phenotypic sex. Chromosomal sex predicts for gonadal sex, which predicts for hormonal sex, which predicts for phenotypic sex.

DSDs and Ambiguous Genitalia

What happens when this process goes awry?

The result is a disorder of sex development. Again, a DSD is defined as any atypical development of chromosomal, gonadal or phenotypic sex. Depending on the root cause of the DSD, it can present in many ways, including atypical external genitalia, delayed puberty, amenorrhea, or infertility. As such, a DSD can present across the lifespan, from birth to adulthood (9).

The objective of the podcast today is to give you an approach to a very specific DSD presentation: ambiguous genitalia. Ambiguous genitalia is defined as an infant that presents with two or more of cryptorchidism, hypospadias, a microphallus <2.5cm, or clitoralmegaly >1cm (9).

Let's break this definition down:

- Cryptorchidism is where one or both testicles are absent from the scrotum.
- Hypospadias is where the urethral meatus -- the opening of the urethra -- is not at the tip of the penis. The opening might be on the underside of the penis or scrotum.
- A microphallus is defined as a stretched penis length < 2.5cm. A typical penis length for a full term male infant is between 3 and 4cm.
- Finally, clitoralmegaly is defined as clitoral length > 1cm. A typical clitoral length for a full term female infant is between 2.5 to 4mm. (12).

To meet the definition of ambiguous genitalia, an infant must present with two or more of cryptorchidism, hypospadias, microphallus or clitoralmegaly. Any one in isolation is not considered to be ambiguous. A baby with descended testicles and typical penis length with mild hypospadias might be described as having atypical genitalia, but the trained pediatrician would not likely have difficulty in naming the sex. Some patient advocates prefer not to use the term ambiguous genitalia, because to the patient, there's nothing ambiguous about their genitals… they are what they are. For the purposes of this podcast, we will use the term "ambiguous genitalia" to refer to those rare cases where the presence of cryptorchidism, hypospadias, and/or microphallus/clitoralmegaly can make assignment of sex of rearing challenging.

Atypical sex determination and development

Now that we have a better understanding of what ambiguous genitalia is, let's review when and why it might happen, versus a different DSD.

As you know, the first step in sexual development is the establishment of chromosomal sex at fertilization, where a baby typically possesses either a 46XX or 46XY complement. Any variation here will cause a sex chromosome DSD. Sex chromosome DSDs occur when the baby has one too little or one too many X or Y chromosomes. They also include mosaicism and chimerism. Turner syndrome and Klinefelter syndrome are the most common presentations of sex chromosome DSDs (7). Let's discuss these in greater detail.

In Turner syndrome the chromosomal complement is 45,X. With only one X chromosome the ovaries do not develop fully and instead remain as streak ovaries. There is no Y chromosome, and in its absence no testes grow, and the hormonal milieu is not male. Instead, the hormonal sex is female, and so female internal and external genitalia develop including the uterus, fallopian tubes, vagina, labia majora, labia minora, and clitoris. Therefore, newborns with Turner syndrome do not have ambiguous genitalia. Instead, this DSD presents with short stature, neck webbing, and delayed puberty (10).

Let's compare this to Klinefelter syndrome, where the chromosomal complement is 47,XXY. Because of the Y chromosome, testicles form. However, because of the extra X chromosome, testicles do not develop completely and they do not function well. As a result, there is some testosterone, but less than normal. Levels are usually sufficient for normal male internal and external genitalia to develop, although sometimes an infant may present with isolated microphallus or hypospadias. As such, newborns with Klinefelter syndrome also do not have ambiguous genitalia. This DSD manifests with testicular insufficiency, so instead individuals often present later in life with signs of androgen deficiency or infertility (11).

These examples of chromosomal sex disorder help us see how DSDs can present across the lifespan, not just at infancy. But what if chromosomal sex is normal? Well, disorders of gonadal sex, hormonal sex, or phenotypic sex may still develop.

We will now talk about the mechanisms that can cause these to happen. The differential diagnosis for each mechanism is complex and is beyond the scope of our discussion today.

Let's first talk about 46XY individuals. In the 46,XY embryo, a DSD can happen as a result of three main mechanisms.

1. First, there can be a failure of testicular formation. Due to gene mutations, testicles may develop incompletely or not at all. This is called gonadal dysgenesis. Without the testicles there, the hormonal sex and phenotypic sex are female.

2. The second mechanism that can cause a 46,XY DSD is insufficient hormonal levels. Testosterone, DHT and anti-Mullerian hormone are all required for male internal and external genitalia to develop typically. If steroidogenic enzymes are deficient or absent, there can be problems here. Depending on the hormonal milieu, this mechanism may present in different ways, including as ambiguous genitalia.
3. The last mechanism in a 46XY individual is androgen insensitivity. This is where, due to mutations in the androgen receptor, a tissue cannot respond to androgenic hormones. Androgen insensitivity can be incomplete or complete.
    1. Individuals with incomplete androgen insensitivity have testicles, and usually have male internal genitalia. Depending on the degree of insensitivity, the external genitalia vary, but can include micropenis, hypospadias and bifid scrotum (13). This can present with atypical or ambiguous genitalia.
    2. Let's compare this with complete androgen insensitivity. Individuals still have testicles, male internal genitalia, and no uterus; however, in complete androgen insensitivity, the external genitalia are female without any ambiguity. These individuals live as females and typically present around puberty with absent body hair and amenorrhea (13).

Now that we have reviewed the three mechanisms in 46XY individuals, let's talk about 46XX individuals. In the 46,XX embryo, there are two main mechanisms that can cause a DSD.

1. First, there can be a failure of ovary formation. This is due one of many rare genetic conditions. There is typical female sexual differentiation, and female external genitalia should develop without ambiguity.
2. The second mechanism that can cause a 46,XX DSD is a situation where the 46,XX fetus is exposed to excess androgen levels during gestation. This excess may originate from mom or baby.
    1. If maternal androgen levels are too high, they will pass through the placenta. This can happen if the mother has an androgen secreting tumor or if she is taking any androgenic supplements. The impact on the fetus will vary depending on the quantity of androgen, and the fetus may develop ambiguous genitalia.
    2. Androgens may also originate with the fetus itself if there is congenital adrenal hyperplasia, abbreviated as CAH (7).
    It warrants spending a few minutes reviewing CAH, because it is the most common cause of ambiguous genitalia, and can be a medical emergency. CAH refers to a family of autosomal recessive disorders where there is disrupted adrenal steroidogenesis. Over 99% of CAH is caused by a deficiency in the enzyme 21-hydroxylase, which is required to make the hormones cortisol and aldosterone. There are other hormones upstream to the enzyme block, and these upstream hormones are diverted to making excess androgens. As a result, CAH presents in the newborn period with cortisol deficiency, aldosterone deficiency, and androgen excess.

What do you think an XX baby with CAH will look like at birth? The external genitalia will have been exposed to high levels of androgens: there might be clitoralmegaly and partial fusion of the labia majora. Some of them might look like baby boys, except they will not have any palpable testicles. Do not discharge home a baby that looks like an apparent-male but without localizable testicles -- the baby might actually be a girl with CAH!

What do you think an XY baby with CAH look like at birth? XY individuals will present as normal phenotypic males on newborn assessment (6). Because they look typically male, their condition might not get picked up right away. This is dangerous because, without early treatment, they might present in 1-2 weeks with signs and symptoms of cortisol and aldosterone deficiency (6). These include vomiting, failure to thrive, lethargy, hypovolemia, dehydration, hyponatremia, hyperkalemia, hypoglycemia and cardiovascular collapse (8). This constellation of findings is called an adrenal crisis.

Because of this emergency situation, in many provinces, territories, and states, newborns are screened within the first few days after they're born for CAH. Screening is done by measuring the17-hydroxyprogesterone concentration, which aims to identify 21-hydroxylase deficiency. However, no screening test is perfect, and so a neonate presenting with clinical symptoms warrants timely testing and management (5).

To summarize, a DSD may occur as a result of a sex chromosomal abnormality or due to one of many different mechanisms. In a 46XY individual, the testicle may not have formed; there might be a block in making androgens; or there might be androgen insensitivity. In a 46XX individual, the ovaries might not have formed, or there might be androgen excess.

As you can see, a DSD may occur as a result of an abnormality at any stage in early sexual determination and differentiation. Depending on the etiology, the individual may present at birth with ambiguous genitalia, or may present later with other concerns.

Approach

Now that we have a better understanding of when and why ambiguous genitalia might present, let us move on to constructing an approach.

So, if there is a newborn presenting with ambiguous genitalia, what should you do?

Before you begin, remember that this presentation can be very stressful and emotionally intense for parents. Initial communication with the family is very important and should be done in an optimistic and respectful manner.

To start, the family should be informed that they have a beautiful baby. It should be noted that this presentation is not a result of any mistake, and that they will be included in the decision process around the baby's sexual development (4).

History

Next take a history. You should take a full newborn history including the prenatal, pregnancy and birth histories.

In addition, you should ask questions that may help you narrow down your differential. First, ask about any maternal virilization during pregnancy: acne, hirsutism, frontal balding, voice deepening, or clitoromegaly. This could indicate a placental aromatase deficiency or a maternal androgen secreting tumor.

Ask about maternal history of hormonal disorders, or any prenatal drug use, specifically inquiring about progestins or steroids.

Continue your history by inquiring about consanguinity. This would increase suspicion for abnormal autosomal recessive disorders like CAH.

Lastly, take a detailed family history for any presence of unexplained death in the neonatal period, ambiguous genitalia, abnormal pubertal development, infertility, or amenorrhea (9).

Physical examination

Now proceed with physical examination. If this will be the baby's first physical exam, combine the following with your typical newborn examination. The baby should be fully undressed.

Begin by taking vitals and weight, length and head circumference. Be sure to include blood pressure in this assessment.

Next initiate your general inspection. Look specifically for any signs of prematurity, any underdeveloped physical features, midline defects, cloacal or anorectal anomalies, or dysmorphic findings that are associated with a possible syndrome. Note that individuals with ambiguous genitalia who are small for gestational age often have other developmental abnormalities.

Continue your examination by assessing skin turgor of the infant, and look for hyperpigmentation of the nipples and genital regions; an abnormality of either could suggest CAH (9).

Now you will begin careful inspection and palpation of the external genitalia.

Start by documenting the number and location of urogenital openings. A urogenital opening is any opening where bodily waste and reproductive fluids are expelled to the environment outside of the body cavity.

Next, identify the presence and position of the gonads by palpating the labioscrotal folds and inguinal area. Labioscrotal folds are paired lateral structures in this region that typically differentiate into the scrotum or the labia majora.

Ensure you are palpating bilaterally to identify any asymmetries or herniations. If you feel gonads in the inguinal canals or the labioscrotal folds these are likely testes. Inspect and palpate the labioscrotal folds specifically for asymmetry, masculinization, swelling, pigmentation, fusion and creases. Next, inspect the phallus for hypospadias, urethral defects, and any abnormal curvature of the penis called chordee.

Continue by measuring phallic length. Do this by stretching the phallus to the point of increased resistance and measuring it on its dorsal surface from the pubic ramus to the tip of the phallus. Lastly, measure clitoral length (9).

Once a thorough physical exam is complete, you should ask yourself if the genitalia appear ambiguous. Does the phallus seem short? Is there hypospadias? Are there testicles in the labioscrotal folds? If yes to two or more of these questions, then you can make an assessment of ambiguous genitalia. If not, then the genitalia are not classified as ambiguous, but may still be atypical.

You should now move on to investigations.

Investigations

Initial investigations for the newborn with ambiguous genitalia should be used to narrow the differential.

To rule out any chromosomal abnormalities, order a karyotype and call the cytogenetics lab to have it expedited. Also order a rapid aneuploidy test, which you will get back quicker. This test will tell you if there is an abnormal number of chromosomes 13, 18, 21, X and Y.

To investigate gonadal sex, first reflect on your physical exam and ensure that your palpation of the inguinal and pelvic region was thorough, and then order an abdo-pelvic-inguinal ultrasound. Let the radiologist know that you are interested in knowing whether there might be any Mullerian structures, like a uterus, and whether there are ovaries or testicles.

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Lastly, to look at hormonal status, it is best to consult pediatric endocrinology to decide which tests to order and when. The most common cause of ambiguous genitalia is Congenital Adrenal Hyperplasia. Remember that 46,XX infants will present with ambiguous genitalia. 47,XY infants will not.
The screen for CAH is a serum 17-hydroxyprogesterone that is part of the normal Newborn Metabolic Screen in Alberta. An abnormal high 17-hydroxyprogesterone is consistent with CAH.

You can also measure serum potassium, sodium, and renin, but keep in mind that K, Na, and renin may not become abnormal until 1 to 2 weeks later. You can also consider measuring a random cortisol, but keep in mind that even with CAH, a random cortisol can initially present as normal. Other hormones that you can consider measuring include serum testosterone, androstenedione, dihydrotestosterone, anti-Mullerian Hormone, and gonadotropins. Note that hormonal measurements should be postponed until the second day of life, once maternal hormones are less concentrated in the infant's system.

These tests, with the notable exception of the ultrasound, do not deliver results quickly, so it is important to get them started.

Depending on the results of all of these tests, a working diagnosis can be made. This will guide further investigations, which may include tests of adrenal steroid biosynthesis, more imaging, or biopsies of the gonads (8).

Management

In terms of management, ambiguous genitalia, like any DSD, is a very complex presentation that will require the assistance of multiple medical and surgical professionals. As already mentioned, this includes early contact with medical genetics to expedite the karyotype. A pediatric endocrinologist should become involved and will be particularly essential in the case of CAH for both acute and ongoing management.

A referral should also be made to pediatric urology or gynecology. There is consensus that functional problems require surgical treatment, so in more severe cases, surgery will be performed. In Canada, surgery for cosmetic outcome is more highly contested. Many, but not all, will wish to delay such a surgery to a later stage in the individual's life, so that they can choose for themselves what they want out of their genitalia (4).

Other specialties that should be involved include psychology or psychiatry, social work, and medical ethics. Early psychosocial care for the family and newborn will help to ease stress. Any initial gender assignment will depend on a number of different factors, including the diagnosis, appearance of the external genitalia, any surgical options, the potential for lifelong hormone replacement therapy, the potential for fertility, and the family's point of view and cultural practices (4).

Lastly, it is essential that the baby is referred to and followed by an experienced pediatrician (4). The pediatrician's role is to act as the quarterback of this multidisciplinary operation while helping the family to navigate the field. This role is essential for the long-term care of the individual and also for the family dynamic.

Overall, a multidisciplinary approach will help achieve the best result for the baby, physically, functionally and psychologically, as well as for the family. The best management of this presentation involves transferring the baby to a center that has collective expertise, personnel, and laboratory and radiologic management.

Keep in mind that it is not expected to be within the scope of any single person's capabilities to diagnose and begin the definitive management of the newborn. This is a complex presentation that will require the collective effort of multiple experts. But it is your role to begin the referral process to these specialties.

Also, consider that most babies with ambiguous genitalia are otherwise healthy. When possible babies should remain in ward rooms where they can bond with their parents. If follow-up is assured, babies can be sent home whenever they are deemed medically fit (9).

The last big takeaway from this podcast is that congenital adrenal hyperplasia should be treated as a medical emergency. If left untreated, the infant can fall into adrenal crisis. Glucocorticoid and mineralocorticoid treatment should be initiated in all infants with a positive newborn screen, even before additional test results are back (8).

Back to the case

Now that we have learned an initial approach to ambiguous genitalia in the newborn, let's apply this to our clinical case. Recall that you are assessing an hour old newborn baby whose genitalia appear neither exclusively male nor female.

You start by taking a full newborn history. Mom is a 28 year old G1P1 with no significant past medical history. She received regular prenatal care, and had an uncomplicated pregnancy. The infant was delivered vaginally at 40 weeks gestational age after a spontaneous labor lasting 21 hours. APGARS were 7 at 1 minute and 9 at 5 minutes.

Mom denies any signs of prenatal virilization, and does not have a past medical history of any hormonal disorders. She reports taking regular prenatal vitamins during the pregnancy, but denies any other drugs or substance use. There is no consanguinity in the family tree, and nothing notable in the family history.

On the physical exam, the baby appears alert and well. Heart rate is 140bpm, respiratory rate is 40/minute, and systolic blood pressure is 60mmHg. After an otherwise normal examination, you proceed to look at the external genitalia. On inspection, the genitalia is apparently male but testicles are completely absent. You recall that an apparently looking newborn male without testicles has CAH until proven otherwise. On inspection and palpation no gonads can be found either in the labioscrotal folds or inguinal region, and you find no herniations. You note one urethral orifice on the underside, at the base of a small appearing phallic structure. You measure this phallic structure to be about 1.5 cm. You appreciate cryptorchidism, hypospadias and a microphallus. You suspect the baby has ambiguous genitalia.

You swaddle and return the baby to its mom, thank the family for their time, and congratulate them again on their baby. You then report back to your preceptor. Your preceptor agrees that CAH should be on the top of your differential. Your preceptor is impressed with how you've handled the situation so far, and asks what you would do for investigations and initial management.

For investigations you would like to order a blood glucose and extended electrolyte panel. You also would like an abdo-pelvic-inguinal ultrasound, a karyotype and a rapid aneuploidy test.

On your suspicion of CAH, you would follow up on the results of the newborn metabolic screen measuring the serum 17-hydroxyprogesterone. In the meantime you would like to call pediatric endocrinology for suspected CAH. As the baby is still only hours old, you remember that the baby is too young to have any other serum hormone levels tested.

Your preceptor approves this plan, and you put it into action. Although you are busy with many other patients, you keep track of the infant's work-up. You learn that the ultrasound indeed revealed a uterus. You check back in a few days and the 17-hydroxyprogesterone has come back as elevated at 153 nmol/L. This confirms your suspected diagnosis of CAH. You check the chart, and see that the baby is now being followed by pediatric endocrinology and has started hydrocortisone, fludrocortisone and salt treatment.

Summary

We have now discussed a full approach to a newborn with ambiguous genitalia. Let us summarize what we have learned:

1. Sex development is a stepwise process that proceeds from chromosomal sex to gonadal sex to hormonal sex to phenotypic sex. At 6 weeks gestational age, if there is a Y chromosome, the bipotential gonad undergoes sex determination when it either develops into testes or does not. The presence of testes will cause the hormonal sex to be male, and for the internal and external genitalia to thus develop along the male pathway. In the absence of a Y chromosome, the bipotential gonad does NOT become a

testicle. Instead, it becomes an ovary. The hormonal sex is female, and the genitalia develops along the female pathway.

2. Disorder of sex development refers to a condition where development of chromosomal, gonadal or phenotypic sex is atypical. Ambiguous genitalia is a type of DSD where a newborn infant presents with two or more of cryptorchidism, hypospadias, microphallus or clitoralmegaly.
3. Disorders of sex development can occur at any step in normal sex determination and differentiation. The differential diagnosis includes sex chromosome DSDs like Klinefelter syndrome and Turner syndrome. In 46XY individuals there can be a incomplete testicle formation, insufficient hormonal levels, or androgen insensitivity. In 46XX individuals there can be a failure of ovary formation, transplacental passage of androgens, or congenital adrenal hyperplasia. The virilizing and salt-losing form of congenital adrenal hyperplasia is a medical emergency that presents with adrenal crisis in the second week of life.
4. Conversation with the parents must be broached with care, empathy and respect. Begin by assessing history of prenatal maternal virilization, hormonal disorders, or drug use. Also inquire about consanguinity and relevant family history. Continue with the physical examination and carefully examine the external genitalia. Initiate investigations include blood tests, abdo-pelvic-inguinal ultrasound and karyotype. Keep the baby and mother together in a maternal ward and initiate psychosocial care. Refer immediately to pediatric endocrinology, pediatric urology or gynecology. If tests for CAH are positive, administer mineralocorticoids and glucocorticoids.

Thank you for listening to this podcast.

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