PRENATAL TESTICULAR MALDEVELOPMENT

Testicular Dysgenesis Syndrome, Tds

A congenital condition characterized by the disruption of fetal testicular development.

Risk factor  Male

About Prenatal testicular maldevelopment

Prenatal testicular maldevelopment is a male reproduction-related congenital condition characterized by the presence of symptoms and disorders of fetal testicular development including anorchia (the absence of both testes at birth; Pic. 1), ambiguous genitalia, streak gonad, and cryptorchidism (undescended testes).

A hormonal etiology most likely underlies this syndrome, although it is believed to have more than one cause, possibly including other than endocrine disruption. Some common causes of endocrine disruption include infection, diet and body weight, lifestyle, genetics, and environmental exposure, but endocrine-disrupting chemicals (EDCs), particularly those with estrogenlike properties, have received the most scientific attention.

Three stages occur in fetal sex development are described to understand the genitalia development:

1. an undifferentiated stage where identical primitive structures develop in XY and XX embryos
2. gonadal differentiation into testis and ovaries
3. differentiation of internal and external genitalia

Phenotypically normal males with 45,X/46,XY may not be diagnosed unless they are evaluated in adulthood for infertility secondary to reduced sperm production from dysgenetic testes. Imaging shows absent to fully developed Müllerian structures (in the female, they will develop to form the uterine tubes, uterus, cervix, and the upper one-third of the vagina; in the male, they are lost), depending on the degree of testicular dysgenesis (congenital developmental disorder of the testicles).

Symptoms

- anorchia
- hypospadias (opening of the urethra is on the underside of the penis; Pic. 2)
- ambiguous genitalia
- cryptorchidism
- poor semen quality
- infertility

Associated diseases

- hypogonadotropic hypogonadism (gonadotropin-releasing hormone deficiency)
- testicular cancer

Complications

The complications of prenatal testicular maldevelopment may occur due to surgery treatment such as infections, bleeding or blood clots, damage of vas deferens (a tiny muscular tube in the male reproductive system that carries sperm from the epididymis to the ejaculatory duct) and the blood supply to the testicle.

Risk factors

- genetics
- low birth weight
- maternal alcohol consumption
- maternal obesity
- environmental estrogens and anti-androgens (synthetic hormones and pesticides used in agriculture)

**Prevention**

Despite progress in identification of endocrine-disrupting substances, researchers are still far from knowing all the risk factors for these birth defects, and advice for prevention must be based on precautionary principles.

**How it can affect fertility**

The testicular dysgenesis, which has various primary causes, can lead to abnormalities in Sertoli and/or Leydig cell function – Sertoli cells provide an immunoprivileged microenvironment for the growth and maturation of sperm cells and Leydig cells produce testosterone. This leads to both impaired germ cell development and hormonal changes during male sexual differentiation. For instance, insufficient production of testosterone can result in incomplete masculinisation, whilst reduced expression of insulin-like factor 3 can lead to incomplete testes descent. The downstream disorders of such abnormalities can include both genital malformations (e.g. hypospadias and cryptorchidism) and delayed reproductive disorders (e.g. testicular cancer and poor semen quality) which comprise prenatal testicular maldevelopment.

Poor semen quality is measured not only by the number of sperm a man produces but also by how effective the sperm is at fertilising an egg. The motility and shape of the sperm are important for this role. A man with poor semen quality will often present with fertility problems which is defined as a couple trying to conceive for over 1 year with no success.

**Prognosis**

Diagnosis of poor semen quality can be made from semen analysis, taking a sample of the man’s semen and running tests to count numbers and quality of the individual sperm.

In case of anorchia, ambiguous genitalia and streak gonads the therapy cannot restore fertility, it can only help with psychological aspect and physical appearance. In case of cryptorchidism, there it is very important the location of undescended testicle. The higher the testicle is, the higher is possibility of infertility. But if the surgery is successful, men can conceive naturally.

As the rise in the incidence of the various symptoms of testicular maldevelopment occured rapidly over few generations, the aetiological impact of adverse environmental factors such as hormone disrupters, probably acting upon a susceptible genetic background, must be considered.

**Find more about related issues**

**Diagnoses**

Azoospermia
Complete absence of sperm in the ejaculate of a man.
Learn more at: [www.fertilitypedia.org/therapy/diag/azoospermia](http://www.fertilitypedia.org/therapy/diag/azoospermia)

**Undescended testes**

In the case of cryptorchidism one or both testes are absent from the scrotum. It is is the most common etiologic factor of azoospermy in the adult.
Learn more at: [www.fertilitypedia.org/therapy/diag/undescended-testes](http://www.fertilitypedia.org/therapy/diag/undescended-testes)
Empty (contracted) scrotum. The testicles are in the groin.

Sources

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