UNDESCENDED TESTICLE

Cryptorchism, Cryptorchidism

Absence of one or both testicle from the scrotum, associated with reduced fertility.

⚠️ Risk factor ♂ Male

About Undescended testicle

Undescended testicle, or cryptorchidism, is the absence of one or both testes from the scrotum (Pic. 1). Two thirds of undescended testes affect only one testicle, the rest of cases are bilateral (affecting testicles on both sides). Undescended testicles are associated with reduced fertility even when surgically corrected, and may lead to severe complications if left untreated.

Undescended testicle is the most common congenital (present at birth) anomaly the male reproductive system. It’s the failure of one or both testes descent (move) into the scrotal sac, and the testicle may be found in the abdomen, in the inguinal canal (inguinal) or just reaching the external ring of the inguinal canal (precrrotal). The third trimester is crucial for the testis descent. When the testis is not found in normal location it may be either palpable or non-palpable.

The palpable testis may be

- cryptorchid (undescended, retained along its path of descent)
- ectopic (retained elsewhere than its path of descent, usually outside the inguinal canal)
- retractile (a testicle which can readily move or be moved between the scrotum and inguinal canal, and is not truly undescended)

Non-palpable testis may be

- cryptorchid
- atrophic (underdeveloped)
- absent, or aplastic (not present at all)

In most cases, the exact cause of undescended testicle cannot be found, making this condition largely idiopathic (without a known cause). It is believed to result from a disruption of hormonal balance and physical changes, which then negatively affect the development and descent of the testicle.

The majority (around 80%) of undescended testicles complete their descent within the first year of life. If the testicle remains undescended, it should be brought down into the scrotal sac using surgery, called orchiopexy (Pic. 2). The undescended testicle is otherwise exposed to a temperature approximately 4 degrees of Celsius higher than the normal temperature in the scrotum. If left untreated, this may eventually cause irreversible damage to the testicle and impaired fertility. Undescended testicles also pose a higher risk for the growth of malignant testicular tumours (Pic. 3). Therefore, if and undescended testicle is discovered in adulthood, it usually has to be removed.

Symptoms

There are usually no symptoms, except that the testicle cannot be found in the scrotum (this may be described as an empty scrotum). In about 90% of cases, the testicle is palpable (can be felt) in the inguinal canal.

Associated diseases

Hypogonadotropic hypogonadism
Congenital (present at birth) hypogonadotropic hypogonadism, such as Kallman syndrome or idiopathic hypogonadotropic hypogonadism, may present with anomalies of the genitals, such as micropenis or undescended testicles. Hypogonadotropic hypogonadism refers to failure of the gonad to produce sex hormones due to disrupted or absent hormonal stimulation from the pituitary gland or the hypothalamus, the centres of hormonal regulation. Therefore, the levels of gonadotropins, the hormones produced by the pituitary to stimulate the function of the gonad, is low ("hypogonadotropic"), as opposed to hypergonadotropic hypogonadism, where the primary cause of low sex hormone production lies within the gonad itself.

**Anomalies of the epididymis**

Cryptorchidism can be associated with various anatomical anomalies, but epididymal anomalies and patency of the vaginal process (PV) are among the most frequent. The vaginal process is a conduit that extends from the peritoneum to the scrotum and is covered by a coelomic epithelium. This conduit is usually obliterated after the end of the testicular migration. In cases where the vaginal process does not close, the child may develop inguinal hernia (protrusion of the contents of abdominal cavity through the inguinal canal) or communicating hydrocele (accumulation of fluid around the testicle).

**Congenital malformation syndromes**

Cryptorchidism occurs at a much higher rate in a large number of congenital malformation syndromes. Among the most common are Noonan syndrome and Prader-Willi syndrome, which both have a genetic cause. Noonan syndrome is primarily characterized by short stature, typical facial features and heart defects, but affected males also commonly present with cryptorchidism. Prader-Willi syndrome is caused by a loss of function of certain genes on chromosome 15. In infancy, it presents with lower muscle tone, poor growth and delayed development. However, during childhood, affected children become constantly hungry and often develop obesity and type 2 diabetes as a consequence. Affected patients cannot have children, and 93% of men with Prader-Willi syndrome have undescended testes.

**Complications**

**Azoospermia**

Cryptorchidism uni- or bilateral is associated with degenerative changes in Sertoli cells (cells supporting the development of sperm cells in the testes) and germ cells and is the most common etiologic factor of azoospermia (absence of sperm cells in the ejaculate). Although the majority of men with a history of undescended testes are capable of paternity, testicular volume and age at orchiopexy are independent predictors of fertility potential and sperm retrieval in men with a history of cryptorchidism. The incidence of azoospermia after treatment for undescended testes is approximately 13 and 34% in unilateral and bilateral cryptorchidism, respectively. However, a 30% and 80% incidence of azoospermia results from untreated unilateral and bilateral undescended testes, respectively.

**Infertility**

Cryptorchidism is a risk factor for male infertility in adulthood. Apart from impaired sperm production, patients with a history of cryptorchidism may have impaired fertility due to other mechanisms. Autoimmune reactions, particularly directed to testicular elements and/or spermatozoa have been found to be often associated with cryptorchidism. Anti-sperm immunization has been proposed as possible additional factor associated with late surgery in pre-pubertal boys with cryptorchidism. Cryptorchidism in young boys can induce immune reactions against sperm-specific antigens. Future fertility status thus may be endangered, because anti-sperm antibodies can impair fertility at different levels. The relationship between the presence of anti-sperm antibodies and male infertility has been documented in a large number of studies.

**Testicular tumours**

The intraabdominal temperature is dangerous for germ cells and cryptorchidism may be a risk factor for testicular malignancy (malignant tumours) in adulthood. About 1 in 500 men born with one or both testes undescended develops testicular cancer, roughly a 4- to 40-fold increased risk. The peak incidence occurs in the 3rd and 4th decades of life. The risk is higher for intra-abdominal testes and somewhat lower for inguinal testes, but even the normally descended testis of a man whose other testis was undescended has about a 20% higher cancer risk than those of other men.

**Risk factors**

- preterm birth
- low birth weight
- family history of cryptorchidism
- diabetes and obesity in the mother
- hormonal dysregulation
• endocrine disruptors (chemicals interfering with hormonal function, disrupting embryonic development)
• increased exposure of a male embryo to estrogens

How it can affect fertility

Many men who were born with undescended testes have reduced fertility, even after orchiopexy in infancy. At least one contributing mechanism for reduced spermatogenesis in cryptorchid testes is temperature. The temperature of testes in the scrotum is at least a couple of degrees cooler than in the abdomen, which is necessary for healthy spermiogenesis. Increased temperature has a well-documented detrimental effect on the structure and function of the testes, eventually leading to a reduced count of sperm (oligozoospermia) or even azoospermia. However, the mechanisms of reduced fertility in cryptorchid males have been found to be much more complex.

Orchiopexy performed early in infancy significantly improves the fertility potential in cryptorchid men, whereas there is still some reduction in fertility compared to healthy men. The reduction with unilateral cryptorchidism is subtle, with a reported infertility rate of about 10%, compared with about 6% reported by the same study for the general population of adult men. The fertility reduction after orchiopexy for bilateral cryptorchidism is more marked, about 38%, or 6 times that of the general population. The basis for the universal recommendation for early surgery is research showing degeneration of spermatogenic tissue and reduced spermatogonia counts after the second year of life in undescended testes. The degree to which this is prevented or improved by early orchiopexy is still uncertain.

Prognosis

A major concern with regard to undescended testicle is potential impaired fertility and increased risk of testicular tumours in adulthood. To reduce these risks, the testis is usually brought down to the scrotum in infancy and fixed there, the surgical procedure is called an orchiopexy. Currently, orchiopexy is recommended between 6 and 12–18 months. There is a documented reduction in fertility even after orchiopexy in infancy, however, the incidence of infertility is much lower than in untreated cryptorchidism.

Find more about related issues

Diagnoses

Testicular failure
The inability of the testicles to produce sperm or testosterone.
Learn more at: www.fertilitypedia.org/therapy/diag/testicular-failure
Possible localizations of undescended (cryptorchid) testes. Such testes can be retained in the natural path of their descent (left half of the picture), or they can be ectopic (right half).

An illustration of the surgery used to bring the undescended testicle down to the scrotum. In this case, the testicle is found in the inguinal canal.

The macroscopic appearance of a mixed germinal cell tumour of the testicle. The risk of germinal cell tumours is highly increased in undescended testicles.

**Sources**

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