

Urologic Surgical Associates of Delaware

Specializing in Robotic Surgery

Male Infertility

Overview

Infertility is the inability to conceive after at least one or two years of unprotected sex. Since most people are able to conceive within this time, physicians recommend that couples unable to do so consider being assessed for fertility problems.

In men hormone disorders, illness, primary testicular disorders, vasectomy and other surgery of the genitourinary system, and sexual dysfunction can temporarily or permanently affect sperm production and prevent conception. Some disorders become more difficult to treat the longer they persist without treatment.

Sperm development (spermatogenesis) takes place in the ducts (seminiferous tubules) of the testes. Special cell division (meiosis) produces mature sperm cells (spermatozoa) that contain one-half of a man's genetic code. Each spermatogenesis cycle requires over 70 days. Sperm development is ultimately controlled by the endocrine (hormonal) system that comprises the hypothalamic-pituitary-gonadal axis.

Because sperm development takes over 2 months, illness that was present several months ago may affect mature sperm, regardless of a man's health at the time of examination. Smoking is a cause of infertility and is obviously reversible.

Incidence and Prevalence

According to the National Institutes of Health, male infertility is involved in approximately 40% of the 2.6 million infertile married couples in the United States. Some of these men experience irreversible infertility and cannot father children, and some of these cases are caused by a treatable medical condition.

Causes and Risk Factors

Common causes for male infertility are impaired sperm production, impaired sperm delivery, and testosterone deficiency (**hypogonadism**). Most cases of male infertility in the United States will be associated with a semen analysis where there are sperm but in lower numbers and a decreased semen motility (movement) and morphology (shape). Decreased sperm numbers (concentration) and/or decreased motility and morphology are called depressed or decreased semen parameters. Men with decreased semen parameters most often get a fertile female pregnant given enough time and the correct application of well-timed intercourse. A typical example is a male with semen concentration of ten

million sperm per cc. Obviously ten million sperm in every cc is a lot of sperm, usually enough to get a fertile female pregnant but it is one-quarter of the normal, expected concentration.

Infertility can result from a condition that is present at birth (congenital) or can develop later (acquired). Causes for infertility include the following:

- Chemotherapy
- Defect or obstruction in the reproductive system (e.g., cryptorchidism, anorchism)
- Disease (e.g., cystic fibrosis, sickle cell anemia, sexually transmitted disease)
- Hormone dysfunction (caused by disorder in the hypothalamic-pituitary-gonadal axis)
- Infection (e.g., prostatitis, epididymitis, orchitis)
- Injury (e.g., testicular trauma)
- Medications (e.g., to treat high blood pressure, arthritis)
- Metabolic disorders such as hemochromatosis (affects how the body uses and stores iron)
- Retrograde ejaculation (i.e., condition in which semen flows backwards into the bladder during ejaculation)
- Systemic disease (e.g., high fever, infection, kidney disease)
- Testicular cancer
- Varicocele
- Smoking

Retrograde ejaculation occurs when impairment of the muscles or nerves of the bladder neck prohibit it from closing during ejaculation. It may result from bladder surgery, a congenital defect in the urethra or bladder, or disease that affects the nervous system. Alpha blocker medications (flomax, uroxatrol, cardura, and hytrin) used to treat BPH can cause retrograde ejaculation. Diminished or "dry" ejaculation and cloudy urine after ejaculation may be signs of this condition.

Testosterone Deficiency

Hypogonadism may be present at birth (congenital) or may develop later (acquired). Causes of the condition are classified according to their location along the hypothalamic-pituitary-gonadal axis:

- Primary, disruption in the testicles
- Secondary, disruption in the pituitary gland
- Tertiary, disruption in the hypothalamus

The most common congenital cause of hypogonadism is Klinefelter syndrome. This condition, which is caused by an extra X chromosome, results in infertility, sparse facial and body hair, abnormal breast enlargement (gynecomastia), and smaller than normal testes.

Congenital hormonal disorders such as leutenizing hormone-releasing hormone (LHRH) deficiency and gonadotropin-releasing hormone (GnRH) deficiency (e.g., Kallmann syndrome) also may cause testosterone deficiency.

Other congenital causes include absence of the testes (anorchism; may also be acquired) and failure of testicles to descend into scrotum (cryptorchidism or undescended teste).

Acquired causes for testosterone deficiency include the following:

- Chemotherapy
- Damage to the pituitary gland, hypothalamus, or testes
- Glandular malformation
- Head trauma affecting the hypothalamus
- Infection (e.g., meningitis, syphilis, mumps)
- Isolated LH deficiency (e.g., fertile eunuch syndrome)
- Radiation
- Testicular trauma
- Tumors of the pituitary gland, hypothalamus, or testicles

Assessing your history of reproductive fertility is important and you should notify your doctor about any of the following:

- Early puberty (may result from hormonal disorder)
- Late puberty (may result from Kallmann's syndrome)
- Previous pregnancy
- Sexual timing (understanding ovulation)
- Sexually transmitted diseases (STDs) (can cause scarring, obstruction)
- Use of lubricants (may kill sperm)

A semen analysis, collected in the lab, is used to examine the entire ejaculate, because seminal fluid can affect sperm function and movement. Generally, two semen samples are taken at different times to account for variables such as temperature and error.

Six sperm factors are analyzed in semen analysis:

- Concentration (sperm/milliliter; cc)
- Morphology (sperm shape; normal structure associated with sperm health)
- Motility (or mobility; % sperm movement)
- Standard semen fluid test (thickness, color)
- Total motile count (total number of moving sperm)
- Volume (total volume of ejaculate)

Azoospermia is the absence of sperm in the semen. Men with normal reproductive tracts and hormone systems can have azoospermia due to a lack of sperm-producing tissue in the testes or an obstruction. Obstructions can be viewed with x-ray. The World Health Organization has established criteria for normal sperm concentration, morphology, and

motility. Total motile sperm count, which should be about 40 million, is calculated by multiplying volume by concentration by motility.

The semen fluid test looks at factors that may impede sperm performance. Abnormally thick semen may cause sperm to swim more slowly through cervical mucus, obstructing fertilization. Abnormal sperm shape (i.e., disfigured or multiple heads or tails) usually indicates poor sperm health. Infertility is likely if 60% or more of sperm in semen is abnormally shaped.

Treatment

At least one-half of male fertility problems can be treated so that conception is possible. There are three categories of treatment for male infertility:

1. **Drug therapy**
2. **Surgery**
3. **Assisted reproduction**

1. Drug therapy

Clomiphene (Clomid or Serophene) blocks estrogen receptors in the hypothalamus resulting in increased GnRH release from the hypothalamus. GnRH stimulates increased sperm production and release. Clomiphene can be used for a male with depressed semen parameters. Antibiotics, like levofloxacin (Levaquin®) and doxycycline (Periostat®), are used to treat fertility-impairing infections of the urinary tract, testes, and prostate, and STDs.

2. Surgery

Surgery for male infertility is performed to treat reproductive tract obstruction and varicocele. **Vasopididymostomy** is a microsurgical procedure that corrects obstruction in the coiled tube that connects the testes with the vas deferens (epididymis). Obstructions commonly result from STDs and also include cysts and tubal closure (atresia), which is usually genetic. **Vericolectomy**, the removal of a varicocele (dilated veins above the teste) from the testes, often results in increased sperm count.

3. Assisted reproduction

Assisted reproduction therapy includes methods to improve erectile dysfunction, induce ejaculation, obtain sperm, and inseminate an egg:

4. **Electroejaculation**
5. **Sperm retrieval and washing**
6. **In vitro fertilization (IVF)**

7. **Intracytoplasmic sperm injection (ICSI)**
8. **Gamete intrafallopian transfer (GIFT)**

Electroejaculation This procedure can be used to produce ejaculation when neurological dysfunction prevents it. An electrical rectal probe generates a current that stimulates nerves and induces ejaculation; semen dribbles out through the urethra and is collected. Retrograde ejaculation is associated with the procedure and sodium bicarbonate is usually taken the day before to make the urine alkaline (nonacidic) and nondetrimental to sperm. Candidates for electroejaculation include men who have retroperitoneal lymph node dissection (RPLND) and those with spinal cord injuries.

Sperm retrieval This technique is used to obtain sperm from the testes or epididymis when obstruction, congenital absence of the vas deferens, failed vasectomy reversal, or inadequate sperm production causes azoospermia. Using a technique called micro epididymal sperm aspiration (MESA), a surgeon makes an incision in the scrotum and gathers sperm from the epididymis, the elongated, coiled duct that provides for the maturation, storage, and passage of sperm from the testes. Percutaneous epididymal sperm aspiration (PESA, or fine needle aspiration) is similar to MESA but does not involve microsurgery. A physician uses a needle to penetrate the scrotum and epididymis and draws sperm into a syringe. Testicular sperm extraction (TESE), the removal of a small amount of testicular tissue, is used to retrieve sperm from men with impaired sperm production, or when MESA fails.

Sperm washing This procedure isolates and prepares the healthiest sperm for insemination. Sperm and washing medium are combined and spun rigorously (centrifuged) and the process is repeated if necessary. The process separates sperm from white blood cells and fatty acids (prostaglandins) in the semen that may hinder sperm motility. It also concentrates sperm, which increases the chance for conception.

Sperm retrieved by MESA, PESA, or TESE may be used in in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI). IVF involves combining eggs with sperm in a laboratory, providing proper fertilization conditions, and transferring the resulting embryos to the uterus. To retrieve an egg, a specialist uses ultrasound to guide a fine needle through the wall and into the ovary or makes an incision in the abdomen to get to the ovary (laparoscopy). Once the eggs are retrieved, they are combined with prepared sperm in a sterile dish for 2 to 4 days. After fertilization, the embryos are transferred to the uterus. IVF is used most commonly for infertility caused by female reproductive abnormalities.

Intracytoplasmic sperm injection (ICSI) may be used with immotile sperm during in vitro fertilization. Using a tiny glass needle, one sperm is injected directly into a retrieved mature egg. The egg is incubated and transferred to the uterus.

Fertilization occurs in 50% to 80% of cases and approximately 30% result in a live birth. The egg may fail to divide or the embryo may arrest at an early stage of development.

Younger patients achieve more favorable results and poor egg quality and advanced maternal age results in lower success rates.

ICSI does not increase the incidence of multiple pregnancies. Long-term information about the health and fertility of children conceived through this procedure is not available because it was first performed in 1992.

While excess sperm from MESA or PESA can usually be frozen for future use, most TESE-derived sperm are not of sufficient quality or quantity for frozen storage (cryopreservation). Multiple MESA or PESA procedures are not recommended, since repetition can lead to scarring.

Gamete intrafallopian transfer (GIFT) This procedure is recommended for couples with unexplained fertility problems and normal reproductive anatomy. Mature eggs and prepared sperm are combined in a syringe and injected into the fallopian tube using laparoscopy. Embryos that result from this procedure naturally descend into the uterus for implantation.

Average conception rate for these procedures is about 30%.

Naturopathic Treatment

Naturopathic treatment for male infertility focuses on improving sperm quantity, sperm quality, and overall male reproductive health. Researchers reported that sperm counts have fallen almost 50% since the 1930s. Although some dispute these findings, it is generally accepted that sperm counts are declining. The cause may be environmental and dietary and lifestyle changes may interfere with men's sperm production. If this is so, improving diet and making healthy lifestyle choices should positively impact male reproductive health.

Nutrition

The importance of a healthy diet cannot be overstated. To function properly, the reproductive system requires the proper vitamins and minerals. Nutritional deficiencies can impair hormone function, inhibit sperm production, and contribute to the production of abnormal sperm.

- **Eat** a natural foods diet that focuses on fresh vegetables, fruits, whole grains, fish, poultry, legumes, nuts, and seeds.
- **Drink** 50% of body weight in ounces of water daily (e.g., a 150 lb man would drink 75 oz of water).
- **Eliminate** processed and refined foods (e.g., white flour), junk food, sugars, alcohol, and caffeine.
- **Avoid** saturated fats and hydrogenated oils (e.g., margarine); use olive oil.

- **Pumpkin seeds** are naturally high in zinc and essential fatty acids which are vital to healthy functioning of the male reproductive system. Eat pumpkin seeds to help maintain a healthy reproductive system.

Supplements

The following supplements may increase sperm count and/or motility. Allow 3-4 months for the supplements to work.

- **Arginine** - Take 4 gr daily. Needed to produce sperm. If the sperm count is below 10 million per ml, arginine probably will not provide any benefit.
- **Coenzyme Q10** - Take 10 mg daily. Increases sperm count and motility.
- **Flaxseed oil** - Take 1 tbsp daily. Is a source of essential fatty acids.
- **L-carnitine** - Take 3-4 grams daily. Required for normal sperm function.
- **Multivitamin-mineral** - Buy a high-quality product and take one serving size (differs from brand to brand).
- **Selenium** - Take 200 mcg daily. Improves sperm motility.
- **Vitamin B-12** - Take 1000 mcg daily. A B-12 deficiency reduces sperm motility and sperm count. Even if no deficiency exists, B-12 supplementation may help men with a sperm count of less than 20 million per milliliter or a motility rate of less than 50%
- **Vitamin C** - Take 500 mg 2 times daily. Is an antioxidant.
- **Vitamin E** - Take 400 IUs 2 times daily. Is an antioxidant and improves sperms' ability to impregnate.
- **Zinc** - Take 30 mg 2 times daily. Required for a healthy male reproductive system and sperm production.

Herbal Medicine

Herbal remedies usually do not have side effects when used appropriately and at suggested doses. Occasionally, an herb at the prescribed dose causes stomach upset or headache. This may reflect the purity of the preparation or added ingredients, such as synthetic binders or fillers. For this reason, it is recommended that only high-quality products be used. As with all medications, more is not better and overdosing can lead to serious illness and death.

The following herbs may be used to treat male infertility:

- **Ginseng** (*Panax ginseng*) - Known as a male tonic (an agent that improves general health) and used to increase testosterone levels and sperm count. Siberian ginseng (*Eleutherococcus senticosus*) may also be used.
- **Astragalus** (*Astragalus membranaceus*) - Increases sperm motility.
- **Sarsaparilla** (>*Smilax spp.*) - Known as a male (and female) tonic.
- **Saw palmetto** (*Serenoa repens*) - Used for overall male reproductive health.

Other Recommendations

- Avoid alcohol. Alcohol consumption is associated with an increased number of defective sperm.
- Consider acupuncture.
- Do not smoke. There is an association between smoking and low sperm count, poor sperm motility, and abnormal sperm.