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REVIEW ARTICLE

CLINICAL ASPECTS OF AZOOSPERMIA: A REVIEW

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ABSTRACT

Infertility is defined as the failure of a couple to become pregnant after one year of regular, unprotected, sexual intercourse. Infertility is not "just a female problem" as there is a male infertility component in approximately 50% of couples. Azoospermia, defined as complete absence of sperm from the ejaculate, is present in about 1% of all men and in approximately 15% of infertile men. Azoospermia may occur because of reproductive tract obstruction (obstructive azoospermia) or inadequate production of spermatozoa, such that spermatozoa do not appear in the ejaculate (non-obstructive azoospermia). This review includes causes of azoospermia, symptoms of azoospermia, diagnosis of azoospermia, evaluation of azoospermia and treatment of azoospermia.

KEY WORDS: Azoospermia, Infertility, Reproductive, Sperm

INTRODUCTION

Male infertility may be the sole contributing reason for the couple's failure to conceive and should be best identified by a male infertility specialist. According to the 2009- National summary report of the American Society for Assisted Reproductive Technology, nearly 35% of infertility is attributed to the male factor. In the late last century, treatment for severe male factor infertility was limited to inseminations or *in vitro* fertilization using donor sperm. However, most infertile couples, and particularly men, are reluctant to use donor sperm because of bias maintained across cultural and ethnic boundaries (1).

Azoospermia is different from aspermia, in that aspermia is the complete absence of seminal fluid emission upon ejaculation. Differentiation of azoospermia from severe oligospermia is accomplished by examination of the pellet of a centrifuged semen sample on at least two occasions (2, 3).

Azoospermia is a condition where no sperm are found in the ejaculated semen. In cases with low ejaculatory volume (less than 1 ml) retrograde ejaculation should always be ruled out. Azoospermia may be caused by obstruction of the epididymis or vas deferens (“obstructive

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azoospermia"- OA) or there may be problems associated with defective spermatogenesis ("nonobstructive azoospermia"- NOA). An urologist/andrologist can usually distinguish between the two by measuring testis size, FSH hormone levels, and occasionally a biopsy of the testis is necessary.

Obstructive azoospermia may be associated with congenital defects such as congenital bilateral absence of the vas deferens (CBAVD), often associated with cystic fibrosis or maybe due to injury, infection or elective vasectomy. If the obstructive azoospermia can be corrected surgically, this is often a more cost-effective option. If surgical repair or reconstruction is not possible, or is ultimately not successful, then sperm must be extracted from either the testis or epididymis. The extracted sperm can then be utilized with in vitro fertilization (IVF), and intracytoplasmic sperm injection (ICSI). In these cases, extraction of sperm from the epididymis is often easier, yielding abundant sperm. For obstructive azoospermia, MESA, (microscopic epididymal sperm aspiration) or PESA (percutaneous epididymal sperm aspiration) are usually successful due to abundant sperm. MESA will often yield a better sample however.

Non-obstructive azoospermia associated with defects in spermatogenesis may also be congenital or can be acquired later in life due to injury or infection. In some cases, pretreatment with medications such as clomiphene citrate to stimulate spermatogenesis may help as adjunctive therapy prior to sperm retrieval. In cases of severe oligospermia, (sperm count less than 5 million/ml) and especially with azoospermia, genetic screening may be very helpful (3, 4).

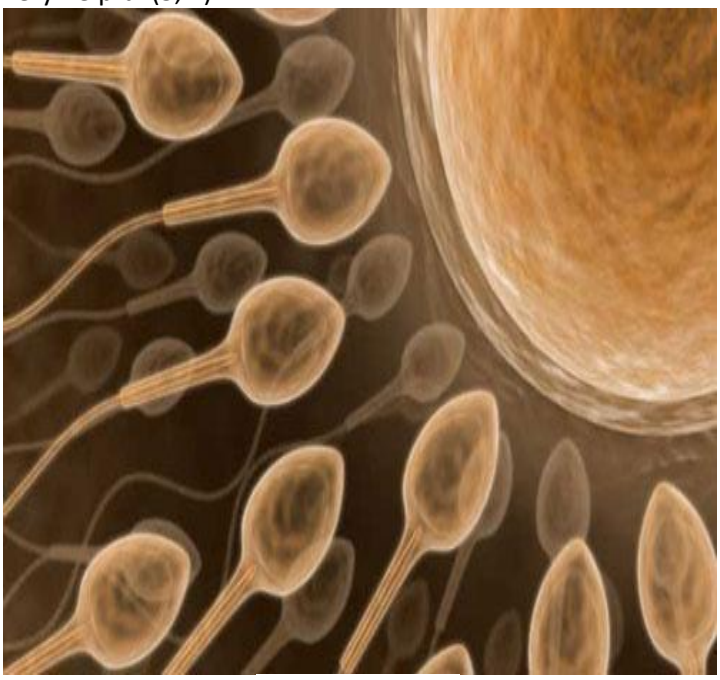

Figure 1: Sperms (5)

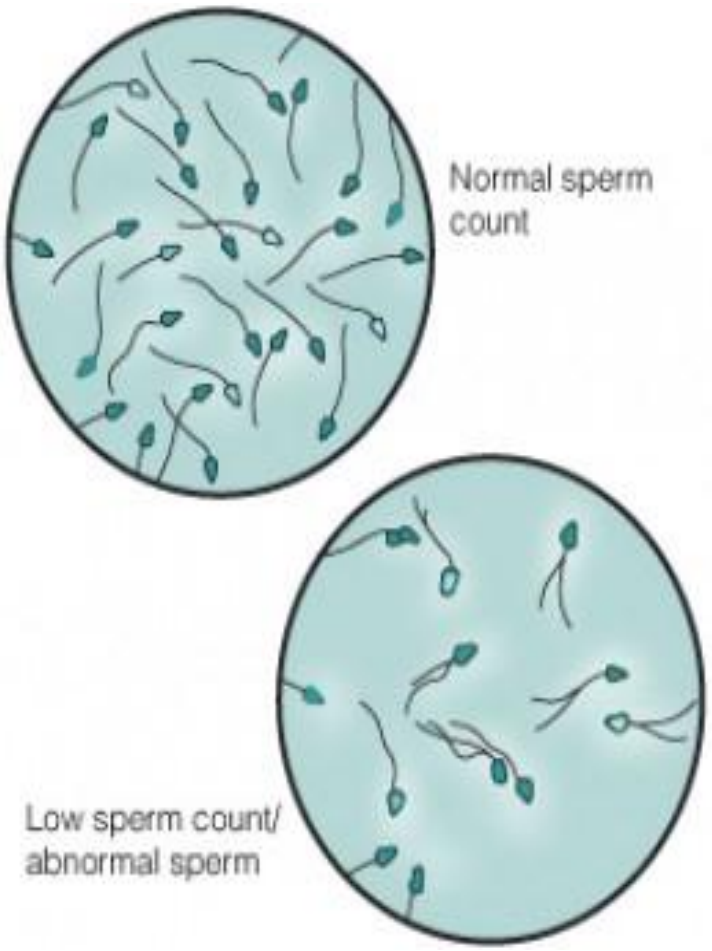

Figure 2: Sperm count in azoospermia (6)

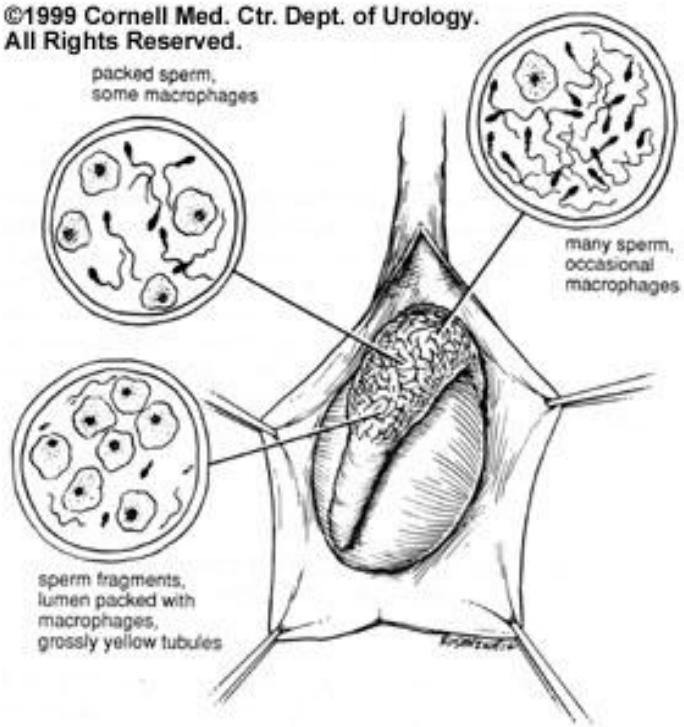

Figure 3: Sperm quality in obstructive and non-obstructive azoospermia (7)

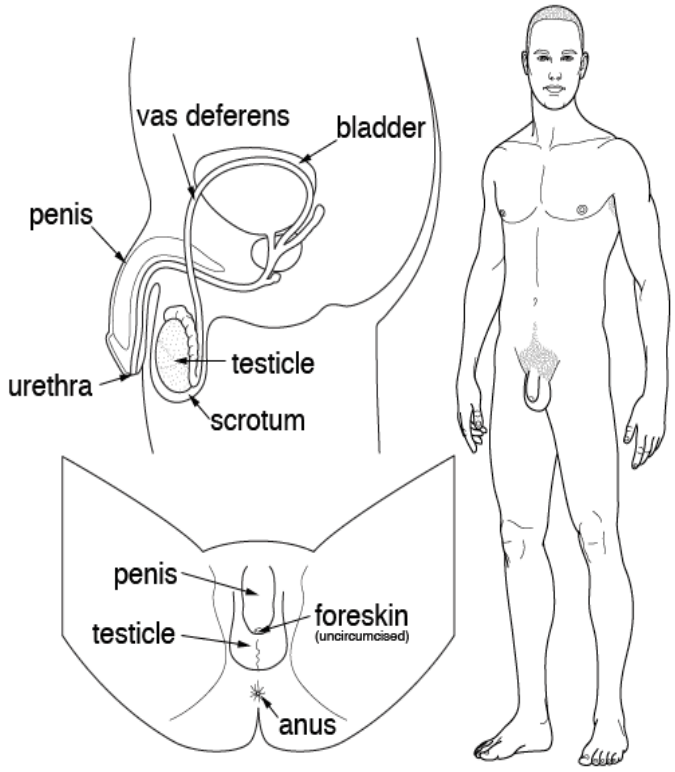

Figure 4: Obstructive azoospermia (8)

CAUSES OF AZOOSPERMIA:

Conditions That Causes Azoospermia:

- Primary testicular failure, Klinefelter syndrome
- Y chromosome microdeletions
- Genetic infertility due to abnormal chromosomes (karyotype)
- Unexplained genetic infertility
- Secondary testicular failure, Kallman syndrome
- Unexplained gonadotropin deficiency
- Hypothalamic/pituitary tumor
- Hyperprolactinemia
- Cancer treatment (chemotherapy, radiation, surgery)
- Varicocele effect
- Pituitary suppression, drug induced (anabolic steroids, alcohol, glucocorticoids)
- Testosterone supplements
- Congenital adrenal hyperplasia
- Severe illness (cancer, kidney or liver failure)
- Diabetes mellitus
- Sickle cell anemia
- Hemachromatosis
- Sperm autoimmunity
- Pesticide/toxin exposure (including hot tubs and baths)
- Undescended testicles at birth
- Obstruction, congenital absence of the vas deferens (CAVD)
- Ejaculatory duct obstruction
- Epididymitis
- Scrotal trauma or surgery
- Young syndrome
- Vasectomy

There are typically two main causes of azoospermia: a problem with sperm production or a problem with sperm transport. There are a variety of factors that may contribute to either of these causes.

1. Sperm Production Problem

Sometimes, azoospermia is the result of a dysfunction within the testes themselves, making it impossible for your body to produce enough viable sperm. In order to produce sperm, the proper cells need to be present in the testes and the proper hormones need to trigger sperm production. Failed sperm production is often the result of:

- **Hormonal Abnormalities:** Sometimes your body may not produce enough of certain hormones involved in the sperm-making process, causing azoospermia. Hormonal imbalances caused by anabolic steroid use or particular disorders, like Cushing's syndrome, can contribute to azoospermia.
- **Cryptorchidism:** Cryptorchidism, or undescended testicles, is a condition in which your testes have not descended properly. It is generally corrected in childhood, however, if it isn't corrected, your testicles will be unable to produce sperm properly.
- **Vascular Trauma:** Trauma to the testes or to the blood vessels within the testes can also prevent your body from producing sperm. Varicocele causes veins in the testes to enlarge and become swollen. As a result, blood pools in the testes, impairing sperm production.

2. Sperm Transport Problem

In order for sperm to leave your body, it must be transported from your testes to your urethra. Sperm travels through a series of ducts inside of your reproductive system, until it eventually mixes with your ejaculate and exits your body.

Sometimes, blockages can occur inside of these ducts preventing sperm from mixing with your ejaculate. Sperm transport problems are often caused by:

- **Vasectomy:** The vasectomy procedure introduces a cut or blockage into your vas deferens, preventing sperm from mixing with your ejaculate.
- **Congenital Absence of Vans Deferens:** Some men are born without the vas deferens, which are tiny tubes that carry sperm to the urethra for ejaculation.

Infection: Certain infections, including STDS, can cause blockages in the epididymis or vas deferens, preventing sperm from mixing with your semen (9, 10).

SYMPTOMS OF AZOOSPERMIA:

Unfortunately, it is very difficult to recognize azoospermia without undergoing fertility testing. This is because there are no symptoms that occur along with the condition. You will likely have semen of a normal color and texture, and will encounter few difficulties with ejaculation. Only a sperm count can diagnose the condition (9).

DIAGNOSIS OF AZOOSPERMIA:

One important point concerning this diagnosis is that although no sperm are found in the ejaculate, there are often usable sperm found in the testis, as not all sperm that are made in the testis actually make it into the ejaculate. There is a "threshold" effect with sperm production, such that if production of sperm is high enough in the testis, then sperm "spill over" into the ejaculate. However, if that critical level of sperm production is not met, there may still be mature sperm in the testis that do not make it into the ejaculate. This concept is the basis for the statement that "sterility may beget fertility." As an internationally recognized pioneer in managing this condition, Dr. Turek sees hundreds of men every year with this diagnosis and he offers a brief, thorough, state of the art evaluation for this problem. See also our information on low sperm count, oligospermia (9, 10).

EVALUATION OF AZOOSPERMIA:

First, a thorough review of medical problems, exposures, past surgery, medications, and family history is undertaken in the office to help define causes of azoospermia. Then, a brief, well-performed physical examination is performed. Third, blood tests are taken that include testosterone and follicle stimulating hormone (FSH). Fourth, two semen samples are needed. With each sample, a standard semen analysis is performed. If no sperm are found, then the semen sample undergoes an additional evaluation in which the sample is "spun" down in a centrifuge to concentrate small numbers of sperm at the bottom of the tube. This "pellet" of the ejaculate is then examined thoroughly for sperm by an experienced lab technician. If 10 sperm or even 1 sperm is present in the pellet analysis, then conditions such as reproductive tract obstruction are painlessly disproved. In Dr. Turek's experience, there is a 20% chance that men with no sperm on semen analyses performed without a centrifuged pellet will have sperm if such a procedure is performed in his laboratory.

Again, the value of finding even a small number of sperm in the pellet analysis is very significant because:

1. It means that complete obstruction is unlikely, and

2. It means that men may have the option of using ejaculated sperm for conception with assisted reproduction and may be able to avoid sperm retrieval procedures for this purpose. Based on this evaluation, if it is not entirely clear as to whether there is a problem with sperm production or a blockage, then further testing may be needed.

FURTHER TESTING:

If, based on the above evaluation, it is not entirely clear as to whether there is a problem with sperm production or one of a blockage in the ducts of the reproductive tract, then the next step is to examine the testis itself and assess sperm production. This can be done in several ways, but the classic approach is to perform a testis biopsy under local anesthesia (10, 11).

TREATMENT OF AZOOSPERMIA:

There are ways to treat azoospermia and possibly restore fertility in some men suffering from the condition. These treatments include:

- Removing blockages in the duct system
- Using medications to restore hormonal balances

Sometimes, however, it is impossible to restore the flow of sperm into a man's ejaculate. This does not necessarily mean that you will be unable to father a biological child, though. New methods of surgical sperm removal are now available, which can remove small quantities of sperm from the testes or around blockages. Common methods include:

- MESA (Micro Epididymal Sperm Aspiration), in which sperm is removed from the epididymis.
- PESA (Percutaneous Sperm Aspiration), in which sperm is taken from directly from the epididymis.
- TESE (Testicular Sperm Extraction), in which a small tissue sample is taken from the testicles in order to retrieve viable sperm (9, 12, 13).

CONCLUSION:

Azoospermia is one of the most severe forms of male factor infertility. It is a condition in which a man has no sperm in his ejaculate. In order to transport sperm outside of the body, it mixes with ejaculate (semen) at certain places throughout the male reproductive system. Sometimes, due to blockages or sperm production problems, sperm does not mix with ejaculate, and therefore cannot leave the body. This is why so many men with azoospermia find it difficult to have children. The most common cause of azoospermia in India was previously smallpox. This infection injured the epididymis, leading to ductal obstruction. Fortunately, this particular disease is now of historical importance only, as it has been

wiped out. Tuberculosis also harms the epididymis, causing azoospermia. Most men facing a semen analysis fear the diagnosis of azoospermia.

However, that diagnosis does not necessarily mean that the man produces no sperm or can never be made to produce any sperm and thus will never have a biological child. Accurate diagnosis of azoospermia is complicated. Correctible causes must be found and treated. Even then if there are no sperm in the ejaculate, sperm can often be harvested and used to achieve fertilization.

REFERENCES:

1. Bin W, Timothy JG and Juanzi S. Advances in Fertility Options of Azoospermic Men. Advances in Embryo Transfer. Available on: www.intechopen.com
2. Jarow JP, Espeland MA and Lipshultz LI, Evaluation of the azoospermic patient. J Urol 1989; 142:62.
3. Willott GM. Frequency of azoospermia. For Sci Inter 1982; 20: 9.
4. Thonneau P, Marchand S, Tallec A. Incidence and main causes of infertility in a resident population (1,850,000) of three French regions (1988-1989). Hum Reprod 1991; 6:811.
5. http://blogs.rediff.com/healthdiet/2011/03/04/azoos permia-treatment-and-increase-sperm-count-home-me-dies/
6. http://healthyadvices.hubpages.com/hub/Useful-things-about-Azoospermia
7. http://www.maleinfertility.org/new-retrieval4.html
8. http://doctor4patient.wordpress.com/2012/04/23/what-is-obstructive-azoospermia/
9. http://www.sharedjourney.com/define/motility.html
10. http://theturekclinic.com/services/male-fertility/azoospermia/
11. http://www.ncbi.nlm.nih.gov/pubmed/15367371
12. Schlegel PN, Shin D and Goldstein M, Urogenital anomalies in men with congenital absence of the vas deferens. J Urol 1996; 155:1644.
13. Belker AM and Steinbock GS, Transrectal prostate ultrasonography as a diagnostic and therapeutic aid for Ejaculatory duct obstruction. J Urol 1990; 144:356.