

Azospemia: Sperm Retrieval Techniques

The production of sperm by the Sertoli cells within the seminiferous tubules of the testis, referred to as “spermatogenesis”, is a complicated process. Spermatogenesis is highly dependent on testosterone production by the Leydig cells of the testis, as well as many other testicular and pituitary hormone interactions. The development of each spermatozoa requires 2-3 months for completion. For that reason, if a man should require medical treatment to improve spermatogenesis, he must wait 2-3 months before any therapeutic effects may be seen.

In order to better understand the anatomy of the testis, imagine the seminiferous tubules to be tiny spaghetti noodles pressed together. Within the interior of these “noodles” sperm production takes place with sperm development within the Sertoli cells that surround the sperm cells, nurturing them with nutrients and chemicals that direct the complicated production of sperm. Between the “noodles” lay the Leydig “cells” that make testosterone.

After production of the sperm in the testis, they mature in the epididymis, a small structure attached to the testis. From the epididymis, sperm travel through the vas deferens, finally emptying into the ejaculatory ducts located within the prostate, where sperm mix with seminal fluid from the prostate and the seminal vesicles.

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 azoospermia”- OA) or there may be problems associated with defective spermatogenesis (“non-obstructive azoospermia”- NOA). A 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, pre-treatment 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. For example, the chance of finding sperm in men with NOA is essentially 0% if they have a genetic microdeletion of the Y chromosome at the AZF A or B locus. On the other hand, cases

caused by mumps, torsion, cryptorchidism and idiopathic causes may be associated with a 50-70% chance of finding sperm. In cases of non-obstructive azoospermia, sperm are generally extracted from the *testis* by various methods. In approaching an NOA patient it is very important to determine a) who has sperm? and b) where is it? Microdissection TESE (testicular sperm extraction) is often successful due to the concept that the seminiferous tubules containing sperm are "thicker" than those that don't. General anesthesia and 25 times magnification are required. Another successful technique involves office FNA mapping (fine needle aspiration) followed then by directed TESE. This can often be done with local anesthesia and no need for an operating microscope.

In cases of OA and NOA involving both epididymal and testicular sperm extraction, the IVF/ICSI pregnancy rates appear to be essentially the same with *fresh or frozen sperm*. Since IVF/ICSI is far less than 100% successful, it behooves the reproductive urologist/andrologist to utilize sperm retrieval techniques that are reliable, associated with low morbidity, but also have the potential to harvest sufficient sperm in order to enable cryopreservation, for future IVF/ICSI attempts.

Summary: In obstructive and non-obstructive azoospermia, a urologist/andrologist can use many different methods for extracting sperm from the testis and/or epididymis including open surgical extraction, microsurgery, as well as needle aspiration. As stated above, with obstructive azoospermia, since larger numbers of sperm are present all choices are possible, but extraction of sperm from the epididymis is often easier. However, with non-Obstructive azoospermia, in order to obtain enough sperm from the testis, open surgery, microsurgery and/or directed multiple needle punctures are required.

Laurence A. Jacobs M.D.

Laurence.Jacobs@integramed.com

www.TheInfertilityDoctor.com

