Semen analysis: A Critical Step in Evaluating the Couple with an Infertility Concern

Individuals or couples who raise questions about troubling delays in conception at a family planning center, will benefit from basic information and simple testing. One in six couples face infertility in the U.S. Studies have indicated that when couples with infertility undergo evaluation, female- only factors are found in 30%, male-only factors in 30%, 30% have both, and the remaining 10% have unexplained infertility. In view of the distribution of the etiology of infertility, testing of the male partner is imperative. Since the primary male factor is poor sperm production, protocols for primary care providers, ob/gyns and family planning clinics include a semen analysis as part of the initial workup or level I evaluation. This module will review the protocol for obtaining a sample, choosing a laboratory, reviewing results, and making recommendations for men with abnormal findings. Psychosocial issues that are raised by male infertility will also be addressed.

Semen Analysis

Semen analysis is the most important single item in the evaluation of male infertility. It is a relatively simple and inexpensive clinical test. The variability in testing parameters used by labs, experience of lab technicians, common errors in sample collection and interpretation of all lab parameters can lead to misleading assessment and instruction to a couple. When possible the test should be performed in a lab where a high volume of semen studies is done.

What parameters of semen testing should be included in the lab analysis:

The World Health Organization (WHO) publishes a laboratory manual for the examination of human sperm. This manual was produced to standardize testing and offer common ranges. Normal ranges for all testing parameters is usually determined by individual labs; some using WHO ranges, literature citations, or control analysis preformed by the lab. The parameters of semen analysis will be described using the WHO ranges.

Appearance of the sample

A normal sample has a grey-opalescent appearance. The ejaculate is initially coagulated and over the first 60 minutes, it becomes liquefied. If the sample does not liquefy, further assessment is necessary.

Volume

The total volume of the sample needs to be measured.
The volume is expected to be 2.0 ml or more.
Sperm constitute approximately 10% of semen volume.

pH of sample after 1 hour after ejaculation

The pH range should be 7.2 to 7.8
A pH lower than 7.2 is often associated with low sperm counts or malformations of the male reproductive tract.
A pH above 7.8 can be an indicator of a urogenital infection.

Microscopic analysis

Sperm concentration

A number of methods are used to count the sperm (manual or computer assisted).
The analysis provides a total sperm count and a per/ ml count
The normal ranges is 20 million/ml or more and a total count of 40 million or more

Motility and viability

At least 50 % of the spermatozoa observed need to be active.
The motion of the spermatozoa needs to be in a straight-line one hour after collection.
The average rate of motility is 50%, that is, at least half of spermatozoa are moving in a forward motion. The remaining spermatozoa can be described as sluggish, weak or immobile. Motility is graded from 0-IV. The expected motility is III or IV.

Morphology

The maturation of a cell in the seminiferious tubule to a mature oval-shaped spermatozoa (with an acromsomal cap) in the ejaculate involves many differentiating steps. Some cells will prematurely terminate the process or result in other shapes; tapering heads; pinheads, round heads. It is important to note that abnormally shaped sperm usually do not participate in fertilization, but if fertilization occurred, there is no evidence to support an increased risk for malformation of the developing fetus. A semen sample usually contains 50% or more normal spermatozoa.

Other elements routinely tested for:

- White blood cells- excess white blood cells can be an indication of an infection

- Fructose - Samples are frequently tested for the presence or absence of fructose. Absence of fructose suggests an obstruction or absence of the vas deferens, a transport tubule from the epididymis to the urethra.

Results:

Written results should outline findings within each of the above-described parameters. Each parameter should include normal ranges. Common descriptive terms to know:

Normozoospermia, an ejaculate falling within normal range of parameters
Oligozoospermia, sperm concentration of less than 20 million
Azoospermia, no spermatozoa in the ejaculate
Aspermia, no ejaculate

If abnormalities are detected on the semen analysis it is important to repeat the semen analysis within 6 weeks. Many factors may affect production of sperm and seminal fluid. These can include medication use over the last 90 days, occupational exposures, alcohol or recreational drug use, bacterial or viral illness that produced a fever.

Another important factor that can impact the semen analysis and that is the procedures used in sperm collection and storage. The following are standard procedures and cautions:

1.The sample should be collected after a minimum of 48 hour and no more than 7-day abstinence.

2.The sample is collected by masturbation and ejaculated into a clean container. For men and couples with prohibitions to masturbation a special collection condom is available. Discuss this with the lab. Lubricants should not be used to facilitate collection. It is important to report to the lab if the entire sample was collected in the container. Loss of any portion may impact final result.

3.The container should be at body temperature and protected from extreme temperatures in storage and transport.

4.The sample should ideally arrive in the lab within one hour of collection. If this is not possible discuss with the lab the option of collection at the lab site.

Sample results that present a concern:

Case	A	Case	B
Volume	3ml	Volume	5ml
pH	7.4	pH	7.6
Count per ml	10 m/ml	Count per ml	23m/ ml
Motility	40%	Motility	20%
Morphology	50%	Morphology	27%

Case A and B both represent the importance of reviewing each parameter individually and it impact on the total quality. Case A not only identifies oligozoospermia but it is complicated by a decreased motility. For this sample, it would be helpful to understand environmental exposures as well as reviewing the lab report for any suggestion of clumping of the spermatozoa (agglutination) and the presence of increased number of white blood cells. Case B on initial review could appear normal but in fact the motility rate in conjunction with a low morphology in a high volume sample suggest a closer review of the case.

What should be the next steps?

1.If this is the first semen analysis, repeat within 6 weeks.

2.Review clinical history (including use of medications), occupational and environmental exposures.

3.Provide the patient a review of the variability in semen analysis and offer educational pamphlets to assist in appreciating the options available to men with less than optimal sperm counts.

4.Refer the patient to an urologist or an andrologist that identifies an interest in infertility.

5.For patients who have struggled with a question of infertility for some time, it maybe helpful to provide them with the name of a local infertility support group leader and meeting information. For most patients this is premature.

What psychosocial issues arise during routine semen analysis testing and evaluation?

A common concern for medical providers and couples is the issue of masturbation. This may not be a topic discussed in the couple's relationship, so the medical provider needs to be available to describe collection procedures. For some medical providers, issues of sexuality are difficult and it may be one reason why so many couples who seek infertility evaluation never participate or are offered routine semen analysis.

There can be anxiety for the man in participating in the testing process. Myths and cultural beliefs about sperm quality can challenge someone's understanding of masculinity and sexual performance. Some times men are reminded of testicular injuries in childhood and they fear the worst. In addition, the collection process may be difficult or expose a sexual dysfunction that is not initially presented in the early assessment of the infertility.

For men who learn that they are azopermic on testing, it is important that they are encouraged to consult with urologist to determine etiology and fertility options: epididymal extraction and intacytoplasmic sperm injection and the use of donor semen. It is not uncommon for men who receive this information to delay referral. Finally, I would encourage the individual/ couple to seek information and support available from a local regional support group.

For couples who receive good news following completion of the semen analysis, introducing the basal body temperature graph and charting ovulation initiates the next step in the level one evaluation process. The next module will review the charting process and provide samples of charts that begin to point at the cause of these couples infertility concern.

Bibliography

(1987) WHO laboratory manual for the examination of human sperm and semen-cervical mucus interaction.
Cambridge University Press, Cambridge, UK