Seminal Fluid Analysis

Lec.4

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Introduction

- Semen analysis is the primary laboratory tool **(in addition to Hormonal profile)** for evaluating the male reproductive function. It reflects the integrity of:

1. Testicular spermatogenesis
2. Epididymal maturation
3. Accessory gland secretions
4. Patency of the reproductive ducts

- Seminal fluid interpretation should include:

1. **Sperm concentration (count)**
2. **Motility**
3. **Morphology**
4. **Additional parameters** (volume, Sperm viability, pH, liquefaction, WBCs)

Semen Collection & Processing:

- Correct collection and handling of the semen sample are critical to ensure accurate and reliable results:

1. **Abstinence period:** The patient should maintain at least 3 days of sexual abstinence.
2. **Sample collection:** The semen must be obtained by masturbation directly into a clean, sterile container, avoiding loss of any portion of the ejaculate.
3. **Liquefaction:** After ejaculation, the sample is allowed to liquefy within 60 minutes at room temperature.
4. **Temperature for Semen Analysis:** All motility assessments should be performed at 37°C to preserve physiological sperm movement

1. Sperm Count (Concentration)

- Sperm concentration refers to the number of spermatozoa present in each milliliter of semen.
- A normal value is ≥ 20 million/mL, indicates adequate spermatogenic activity.
- The epididymis plays a key role in concentrating and maturing the sperm.

2. Sperm Motility Types

- Progressive motility (PR): Forward, linear movement (fast or slow).
- Non-progressive motility (NP): Movement without forward progression.
- Immotile (IM): No movement.
- **Normal Values**
- Total motility (PR + NP): ≥ 40%
- Progressive motility (PR): ≥ 32%Motility

- **Common Causes**

1. Varicocele,
2. Genital tract infections,
3. Smoking
4. Hormonal disturbances (Poorly matured sperm)

3. Sperm Morphology

- **Normal morphology:** ≥ **4%** normal forms
  The normal sperm cell shows an **oval head**, a well-formed **acrosome (40–70%)**, a **normal midpiece**, and a **straight, uncoiled tail**.
- Morphology mainly reflects the quality of **spermiogenesis**, including proper **Sertoli cell support**, **acrosomal formation**, and **chromatin/DNA packaging** during final maturation.

4. Additional Parameters

◉ Semen Volume

- Normal volume per ejaculate is 1.5 – 5 mL after several days of abstinence from sexual activity. The volume of semen and the sperm count decrease rapidly with repeated ejaculation.
- Low volume → ejaculatory duct obstruction or low accessory gland secretions

- **pH**
  - Normal: ≥ 7.2
  - Low → seminal vesicle obstruction
  - High → infection
- **Sperm viability**
  - Normal: ≥ 54% live sperm
- **WBC Count**
  - Normal: < 1 million/mL
  - High → infection

How to Interpret a Normal Report

Parameter	WHO Normal Value	Interpretation
Sperm count	**≥ 20 million/mL**	Adequate spermatogenesis
Total motility	**≥40%**	Good motile population
Progressive motility	**≥32%**	Effective forward movement
Morphology	**≥4%**	Normal spermiogenesis
Volume	**≥1.5 mL**	Normal accessory gland function
Sperm Viability	**≥54%**	Normal viability
pH	**≥7.2**	Normal seminal vesicle and prostate secretion

- **Interpretation of a Normal Report**
- Normal motility and morphology indicate proper epididymal maturation.
- Testicular function is sufficient to support normal spermatogenesis.
- Seminal vesicles and prostate are functioning appropriately, as reflected by normal ejaculate volume and pH.
- White blood cell count is within normal limits, suggesting absence of infection
- **Clinical Notes:**
- One normal semen sample does not guarantee fertility—WHO recommends two samples at least 2–3 weeks apart.
- Semen analysis must be interpreted with clinical history and hormonal profile if needed (FSH, LH, testosterone, prolactin).

Male infertility factors:

- The term infertility is defined as the failure to conceive after one year of frequent unprotected intercourse.
- Male infertility factor may involved of:

1. Aspermia
2. Azoospermia,
3. Oligozoospermia,
4. Asthenozoospermia,
5. Necrozoospermia,
6. Teratozoospermia,
7. Leucocytospermia

- additional to that of immunological factor.

- **Aspermia:**
- A case combined with patient can produce completed ejaculation process but without evidence of containing semen. like retrograde ejaculation (post surgery or drugs).
- **Azoospermia**: is the term used when there is a complete absence of sperms in ejaculate (semen), even after centrifugation. It may result from primary testicular failure.
- **Oligozoospermia**:
- Means decrease the concentration of spermatozoa in the seminal fluid.

- **Asthenozoospermia**
- Is a common cause of male infertility, occurring alone in about 24% of cases and combined with reduced sperm count or abnormal morphology in an additional ~55%.
- It is clinically important because only motile sperm are capable of progressing through the female reproductive tract to reach and fertilize the oocyte.
- Asthenozoospermia is diagnosed when < 50% of sperm show forward or total motility within 1 hour after ejaculation, indicating impaired sperm movement (Why?)

Necrozoospermia:

- A condition in which spermatozoa are completely immotile because they are non-viable, despite normal count and morphology. It commonly results from microstructural sperm defects or epididymal dysfunction causing premature sperm death.
- **Teratozoospermia:** Teratozoospermia: < 4% normal forms associated with reduced fertility and a higher likelihood of DNA fragmentation due to defective spermiogenesis was regarded as important abnormal infertility factor which are classified according to WHO as follows:

A. Head shape/size defects.

B. Neck and midpiece defects.

C. Tail defects

What is Teratozoospermia?