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Infertility: A brief description of infertility evaluation

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Abstract

Nature has invented reproduction as a mechanism for life to move forward. Every living system has been awarded a magical power to reproduce. In nature there are two kinds of reproduction, asexual and sexual reproduction. Human use sexual reproduction to bring their progeny in life. Humans who have fertile feels very lucky because 15-20% couple are infertile. Average incidence of infertility is about 15%, globally varies in different population.ⁱ According to Indian society of assisted reproduction, infertility currently affects about 10 to 14% of Indian population, with higher rate in urban area 1 out of 6 couple is impactedⁱⁱ. Nowadays some significant social, physical, psychological and medical factors are affecting couple adversely by inhibiting their power to reproduce. In this article author will shortly describe what is Infertility, Few Terms related to infertility Causes of infertility, what we will ask with male and female partner while history taking? Investigations and treatments.

Keywords: Infertility, evaluation, Nature

Introduction

What is Infertility?

A couple is said to be infertile who has done unprotected intercourse for one year and are not able to conceive. Studies shows that only 15-20 % couple are infertile because 80% couple are able to conceive with in first six months and 90% couple are able to conceive within one year of unprotected intercourse. Fertility also depends on the act of intercourse like, one act of intercourse at 14th day, chance of conception is about 4-8% but with multiple acts in a month 25% chances increases.

Table 1: Specific terms related to infertility

Infertility	Implied apparent failure of the couple to conceive
Sterility	Implies absolute failure of the couple to conceive
Impotence or erectile dysfunction	A person who is unable to perform sexual intercourse
Primary infertility	A couple who has never been pregnant
Secondary infertility	A couple who has previous child or abortion
Subfertility or Delayed fertility	When a couple conceive after trying for almost a year.
Fecundity	Ability to have a live birth
Fecundability	Probability of having pregnancy in one cycle or number of cycles taken to conceive.

Causes of Infertility

Percentage of distribution of cases responsible for infertility

Table 2

Male	20-30%
Female	30-40%
Both male and female	10-40%
Unexplained	10-20%

Faults in the male partner

There are so many causes are described in this table ^[iii] given below but the commonest complaint on OPD Basis is –

1) Azoospermia

2) Oligospermia

3) Psychiatric disorder: erectile dysfunction, premature ejaculation

Table 3

Pre-testicular	Testicular	Post -testicular
		Obstruction of efferent duct
Endocrine	Immotile cilia (Kartagener syndrome)	1) Congenital
Gonadotropin deficiency	Cryptorchidism	Absence of vas deference (cystic fibrosis)
Obesity	Infection (mumps orchitis)	Young's syndrome
Thyroid dysfunction	Toxins: drugs, smoking, radiation	2) Acquired infection
Hyperprolactinemia	Varicocele	3) Surgical
Psychosexual	Immunologic	Herniorrhaphy, vasectomy
Erectile dysfunction	Sertoli- cell- only syndrome	Others
Impotence	Primary testicular failure	1) Ejaculatory failure
Drugs	Oligoastheno- teratozoospermia	2) Retrograde ejaculation
Antihypertensive		3) Hypospadias
Antipsychotics		4) Bladder neck surgery
Genetic		
47XXY		
Y chromosome deletions		
Single gene mutations		

Faults in female partner

Percentage of Cause of female infertility ^[iv]

Table 4

Ovulatory dysfunction	30-40%
Tubal disease	25-35%
Uterine factors	10%
Cervical factors	5%
Pelvic endometriosis	1-10%

Anovulatory factors are most common followed by *Tubal factors*. Anovulation is also the **most treatable** cause. Details of female cause are given in this table ^[v]

Table 5

Ovarian dysfunction	Tubal dysfunction	Others
Endocrinopathies	Altered tubal motility	Dyspareunia (poor coital function)
▪ Defective folliculogenesis	Pelvic adhesion, tubal obstruction	Abnormal peritoneal fluid
▪ Anovulation	Distortion of normal tube and ovarian relationship	Abnormal systemic immune response
▪ Luteal phase defect	Impaired pick up of oocyte by the fimbria	Increased sperm phagocytosis by macrophages
▪ Hyperprolactinemia		Fertilization and Implantation failure
▪ LUFs (luteinized unruptured follicular syndrome)		Early miscarriage
Oocyte maturation defect		
Luteolysis due to increase PGF2 alpha		

History taking

Evaluation of infertility includes a detailed history taking and examination of both the partners and specific diagnostic tests.

History taking is an art it's totally depends on you how deep knowledge you can gain regarding their problems.

Table 6: Some common questions for both partner

Question for male and female partner	What is the importance	
	In male	In female
Age	After 40 years more chances of sperm DNA fragmentation	Because ovarian reserve decline after 35 years and if female is more than 40 there is very low chances of conception, 40% would abort
Marital life	For how long they are trying to conceive	
Act of intercourse	Because chances of conception depend on act, if they don't have knowledge about fertility period counsel them	
Contraception use	Because some contraceptive kills the sperm	In Female IUCD use may cause PID
History of previous	It reveals most of things regarding their coital act, mental stress etc	

marriage if any		
Sexual dysfunction	Is they being able to perform coitus in proper method	
Any infection occurs after achieving puberty	Because Epididymo - orchitis: Mumps, TB, filariasis, all these diseases decrease the sperm quality	Recurrent PID, Endometriosis, TB pelvis is major cause to not let reproductive system healthy. It may cause adhesions, tubal impatency, abnormal uterine bleeding and so many more.
Previous surgery	Like Orchidopexy for undescended testes, Hernia surgery, Hydrocele surgery or any injury near around external reproductive system because it may cause obstruction at any level to not get actively motile sperm in seminal fluid	Like MTP/Abortions can cause endometriosis and peri-ostial infection and it may lead to cornual block or whole tube may get infected by retrograde flow. If there is any abdominal or pelvic surgery it may related to peritubal adhesions
Alcoholic	180 ml/ week is upper limit of alcohol consumption if he/she is taking more than this it hampers sperm and ovum quality	
Smoking	Also cause bad effect on sperm and ovum production, quality, transport, fertilization.	

Two more questions are asked for female partner one is **menstrual history** and other is previous **obstetric history**. *Menstrual history* should be taken in details. Wide spectrum of abnormalities ranging from hypomenorrhea, oligomenorrhea to amenorrhea are associated with disturbed hypothalmo- pituitary ovarian axis which may be either primary or secondary to adrenal or thyroid dysfunction. This table revealing how to take menstrual history

Table 7

Menstrual history
Age of menarche
Last menstrual period (LMP)
Duration of bleeding
Interval of cycle
Amount of blood loss
Number of pads used in a day
Passing of clots
Painful/ painless

Previous obstetric history including number of pregnancies, the interval between them and pregnancy related

Table 9

BMI	
Hair growth	
Gynecomastia	
Inspection and palpation of the genitalia	Examine size and consistency of the testicles
Testicular volume	Should be at least 20 ml
Varicocele	Should be elicited in the upright position

Physical Examination of Female

General, systemic and gynaecological examinations are made

complications are to be enquired and we have to write in GPLA here G stands for Gravida means how many times she has been pregnant, P stands for how many times she had cross period of viability (in India viability period is still 28 weeks), L stands for how many live babies she has and A stands for Abortion. While taking detail obstetric history we can make this kind of table which is shown below.

Table 8

S.no.	Year	Pregnancy duration	Labour event	Method of delivery	Puerperium	Baby
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In the case of secondary infertility, the obstetric history is important. Because the history of post abortal or puerperal sepsis may be responsible for ascending infection and tubal damage. Sometimes while performing surgical MTP due to vigorous curettage *uterine synechiae* may develop.

Physical Examination of Male ^[vi]

It is necessary to determine the general state of health. This includes

to detect any abnormality which may hinder fertility.

Table 10

General examination	Obesity, BMI, Hirsutism, acne. Acanthosis Nigricans, PCOS, and note if there is any underdevelopment of secondary sexual character present or not
Systemic examination	For hypertension, any heart disease, renal problem, thyroid dysfunction
Gynaecological examination (Per speculum, per vaginal with bimanual examination)	For vaginal discharge, cervical tear or chronic infection, undue elongation of the cervix, uterine size, position and mobility, palpate if there is any unilateral or bilateral adnexal mass present or not if present – is it fixed or mobile with or without tenderness

Infertility Investigation in Male

- Semen analysis:** This should be the first step in investigation. For good result coitus should be avoid for 3 days prior to the test. The collection is best done by masturbation and semen is collected in a

clean dry glass jar and the test should be done within 2 hours. Normal male fertility requires a count of over 15 million spermatozoa per ml and a progressive motility of over 32%.

Table 11: 2010 WHO Semen Analysis

Ph	>7.2 (prostatic secretion: Acidic, seminal vesicles secretion: alkaline)
Volume	>1.5ml
Concentration	>15 million/ml
Count	>39 million (36-42 million)
Motility	>40% (>32% must be actively motile)
Morphology	>4% should be normal
Vitality	>58% should be live
Leucocyte count	<1 million /ml

Single most important parameter: Morphology

Two properly performed semen analysis at least 4 weeks apart should be done when one report is **abnormal**. **In-Depth evaluation is needed** in case of **Azoospermia** (No spermatozoa in the semen) and in **extreme Oligospermia/Oligozoospermia** (sperm count is less than 15 million/ml). Here **Hormonal study, Transrectal ultrasound (TRUS), Testicular biopsy** is advisable for confirmation of diagnosis.

Infertility Investigation in Female

- 1) **Examination**
- 2) **TVS**
- 3) **Ovulation tests**

- Basal body temperature (>0.5-degree F): Progesterone is thermogenic, hence a rise in basal body temperature is suggestive retrospectively of ovulation.
- Serum progesterone: >3ng/ml on day 21, is retrospectively suggestive of ovulation
- LH:>15 IU
- **Serial USG- Follicular Monitoring** is done serially from **day 9 onward**, to follow growth and rupture of a dominant follicle. This is the **most common method used**.
- Direct evidence is by laparoscopy, a yellow punctum on ovary is suggestive of ovulation.
- Cervical mucous studies: **Loss of spinnbarkeit and ferning** due to progesterone. **Note that** the presence of both of these is suggestive of estrogen effect and not ovulation.
- **Premenstrual Endometrial biopsy:** This is done from **day 20-26**, in the premenstrual period. Presence of secretory changes is suggestive of ovulation. Endometrial changes should correspond to day of biopsy, thus when the difference b/w observed and expected changes is >2 days, it implies **Luteal Phase**

- **Defect**, which is an important cause of infertility.
- Mittelschmerz- Mid-cycle pain, however it is not a very reliable sign of ovulation.

4) Hysterosalpingography

- Radio-opaque dye pushed into uterus with Leech cannula and the uterine cavity and tubes are seen with fluoroscopy outlines both uterine cavity and tubal patency. However, it doesn't talk about outer adhesions/ endometriosis

5) Sonosalpingography: fluid is pushed into cavity and the outline is thus better seen on USG

6) Laparohysteroscopy: it is better investigation to know *anatomy, adhesions, endometriosis effecting fertility*. Along with this, dye can be put through cervix, which can be seen coming out of tube through the laparoscope known as **chromopertubation**, which confirm tubal patency. In the same sitting, a hysteroscopy is done to check uterine cavity for anatomical defects or lesions or adhesions. If an HSG is done, which shows blocked tubes, a laparoscopy must be done to confirm.

Treatment options

To improve spermatogenesis and anovulation the following measures may be helpful
 In General care we motivate patients to improve their general health, must reduce their weight if he / she is obese, avoidance of alcohol and heavy smoking is advisable in both partners.
 There are so many medical and surgical options are available in present era to treat infertility in this table most popular one and important techniques are explained.

Table 12

Treatment	Male indication	Female indication
1) Ovulation induction		For Anovulation
2) Intra uterine insemination	Low sperm counts 5- 10 million	For cervical factor: -stenosis, anti-sperm antibodies Endometriosis
3) In vitro fertilization	Low sperm count 5 – 10 million	Cervical factor + Tubal blockage
4) Intra Cytoplasmic Sperm Injection	Very low sperm count < 1 million	

In case of **obstructive azoospermia** (in male) **Sperm extraction techniques** are used

There are some methods to collect sperm

- PESA (Percutaneous Epididymal Sperm Aspiration)
- TESA (Testicular Sperm Aspiration)

- MESA (Micro Surgical Epididymal Sperm Aspiration)
 - TESA (Testicular Sperm Extraction)
- Single best technique for sperm extraction: MESA*

Tubal factor in female ^[viii]

Tubal factors for infertility are corrected only by surgery

Table 13

▪ Peritubal adhesion	Corrected by salpingoovariolysis
▪ Proximal tubal block	Salpingography under fluoroscopy may helpful Or Cannulation and balloon tuboplasty
▪ Distal tubal block	<ul style="list-style-type: none"> ▪ Fimbrioplasty/ fimbriolysis ▪ Neosalpingostomy

Tubal surgery may be tried for mild proximal tubal block, otherwise IVF is considered as the best treatment option for any complicated tubal occlusive disease.

Conclusion

ⁱ <https://nhp.gov.in>disease>infertility>.

ⁱⁱ <https://thediplomat.com>2018/05>

ⁱⁱⁱ DC Dutta's Textbook of Gynecology Hiralal Konar 7th edition p.no. 187

^{iv} DC Dutta's Textbook of Gynecology Hiralal Konar 7th edition p.no. 188

Through this article author has tried to give a short description on male and female infertility, what are the most common questions are asked by doctors while visiting infertility clinic, and what is the treatment options for infertile couple. I hope this article might be helpful for reader.

^v DC Dutta's Textbook of Gynecology Hiralal Konar 7th edition p.no. 189

^{vi} DC Dutta's Textbook of Gynecology Hiralal Konar 7th edition p.no. 190

^{vii} DC Dutta's Textbook of Gynecology Hiralal Konar 7th edition p.no. 201