Chapter

Understanding Male Infertility for Promising ART

Mahrukh Hameed Zargar, Faisel Ahmad, Mohammad Lateef and Tahir Mohiuddin Malla

Abstract

Infertility is a serious problem of not being able to conceive despite regular intercourse for more than a year. Natural conception is seen to be achieved in 80%–85% of couples. About 15% of couples suffer infertility with male factor contributing to almost 50% of cases. Paradoxically, on traditional assessment, the underlying etiology of male contribution towards infertility remains unrecognized in 30% of the patients and thereby grouped as idiopathic. Diagnostics of male infertility cannot therefore be limited to usual semen analysis only. The spectrum of the recent research encourages the experts in the field to approach the Clinical, Molecular and cytogenetic shades associated with the problem besides secondary factors like life style and environment. Clinical assessment sums the medical history and physical examination of the affected individual. Molecular and cytogenetic analysis help gain new insights in understanding the problem and thereby an advantage for a successful assisted reproductive treatment (ART). Given the cost and burden ART puts in and prior to application of any invasive techniques, understanding precisely the etiology associated with male infertility is essential for the fertility specialist to circumvent inefficient or any unproductive steps in the fertilization process besides helping in counseling patients on their chance of success with the use of reproductive technology.

Keywords: Male infertility, Assisted reproduction, xenobiotics, oxidative stress

1. Introduction

Male infertility is a multifactor problem, the sensitivity of the infertility plus the relative paucity of information around male infertility gravitate scientific senses to think and extensively explore the aetiologies associated with it [1]. To bring the underlying causes to surface one can approach the problem viz-a-viz many different contours- Clinical examination, Molecular analysis and cytogenetic assays, life style and environmental factors. While standard Clinical assessment sums the medical history and physical examination of the affected individual, Molecular analysis help gain new insights in understanding the problem and thereby a boon in diagnosis [2]. Cytogenetic version that aims to provide the karyotype spectrum of idiopathic infertile men precisely provides lead in efficient counseling of couples and further gaining the mileage in reproductive assistance [3]. Important to mention here that apart from the aforementioned three factors, available data in literature provide evidences of environmental factors playing an instrumental role in male infertility, the

natural and synthetic chemicals after interacting with endocrine system disturb fertility of men [3]. With the advance of industrial revolution, Fifty years down the li ne has seen a mushroom growth of chemical industries in developed and developing countries both. All this has finally resulted in the excessive release of xenobiotics into the environment [4]. Male reproductive system is very sensitive to these factors (environmental) that impair the fertility. Factors related to life style such as smoking, temperature and alcohol also prove detrimental to male fertility [4]. Oxidative Stress (OS) has an important role to play in human reproduction. It arises mainly due to excessive ROS production or impaired antioxidants defense mechanism [5].

To squeeze the width of obscurity associated with male infertility and to further infiltrate deep in possibility of finding compatibility of causes in resolving the issue at assisted reproductive level, the experts of the field have to imperatively rely on finding the spots that are even remotely linked to the infertility [6]. All this necessitates the investigation that spans between the congenital, acquired and idiopathic factors contributing to the infertility. The research thereby cannot be limited to routine investigations that include the semen analysis, hormonal profile and usual physical examination.

Looking at this escalating problem from the standard semen analysis, males are being considered as unproductive while failing to meet the standard WHO parameters, Apart from the possible aetiologies in the likes of oligospermia (low sperm concentration), asthenospermia (low sperm motility) and teratospermia, (distorted morphology), semen analysis also rules out the possibility of underprivileged semen as the cause of failure of sperm capacitation that ultimately leads to infertility [7]. One study at the reproduction Biology laboratory from the university Hospital of the Marseille (France) carried between 1988 and 2007, incorporated the semen analysis of 10932 male partners of infertile couples figured the declining trends in sperm concentration (1.5% /year). Data further mentions the decline in sperm count (1.6%/year), total motility (0.4%/year), rapid motility (5.5%/year) [7]. In gaining the understanding of infertility, routine examination subscribes to the findings that traverses between the cryptorchidism (uni or bilateral), testicular trauma, genitourinary infections, gonad toxic medication that includes the anabolic drugs, exposure to radiations involving both occupational as well as therapeutics, testicular torsions, anorchia, gynaecomastia, abnormal testicular volume and varicocele. In evaluation of hormonal profile, men with testicular deficiencies show hypergonadotrophic hypogonadism, increased levels of follicle stimulating (FSH) and luteinising hormone (LH) with low levels of testosterone. All these play havoc on the normal development of spermatogonia thereby prove very detrimental to the reproductive health of men [8].

2. Clinical factors and male infertility

Anatomical disorders distract the ability of man to produce viable sperms. Fertility centres regularly work with the specialists to diagnose the anatomical causes responsible for Male infertility [8]. Some of the common forms of anatomical factors include.

2.1 Varicocele

The anatomical issues can surface as varicocele, a condition in which the enlargement of testicular veins adversely affects the sperm quality and production. In certain cases varicocele can even impair the development of testicles. Varicocele can lead to the increased state of the temperature of testes and thereby causes the

reflux of metabolites (toxic) of adrenal vein to the left kidney [9]. It is reported that 40 percent of infertile men have varicocele being diagnosed as the primary reason of the ailment.

2.2 Obstruction

Tube blockage is one more reason for the infertility in men. Obstruction in the tubes that pave way to the passage of sperm from the testicle to penis can have underlying causes like previous infections, pelvic surgeries, and cystic fibrosis associated with it. In case a severe duct obstruction is found, patients are advised to undergo the invasive procedure like transurethral resection to pave way for the normal course of ejaculate besides proving very important for the maintenance of sperm parameters [10].

2.3 Erectile dysfunction

Most prevalent reason for erectile dysfunction includes neurovascular problems, or psychological factors [11]. The main symptom involves the inability to keep an erection firm enough for intercourse. Though, most men experience difficulty in keeping the erection but erectile dysfunction is only considered a concern if it impairs the satisfactory sexual performance [11]. Erectile dysfunction is usually caused by anxiety, fatigue, or consumption of alcohol [12]. Drugs like sildenafil are used to raise the blood flow to the penis to aid the cause of the erection [13]. Possible causes include the tapering of penis blood vessels, increased blood pressure, raised cholesterol, hormonal issues or even the side effects of the other prescribed medicines.

2.4 Hypospadiasis

Another problem associated with the infertile men is hypospadiasis. More common in infants with a family history for hypospadiasis [14]. It is a condition of opening of penis on the underside rather than the tip. Hypospadasis is a birth defect with urethral opening on the underside of the penis instead of being terminal [15]. Early symptoms of hypospadiasis can be the downward curve of the penis (chordee), baby may spray while urinating. The appearance of hooded penis with only the top half of the penis being covered with foreskin [16]. Hypospadiasis affects one of every 250 male at birth. Hypospadiasis can be glandular, cornal, distal penile,proximal,scrotal or even perineal [17] (**Figure 1**).

2.5 Orchitis

Orchitis is a condition of the inflammation of the testicles. It can affect one or both the testicles. Common cause of orchitis can be a bacteria or a virus, most often the underlying cause is the bacterial infection (Sexually Transmitted Infection) [18]. Mumps virus can also be the reason of orchitis. Bacterial infection is more commonly seen in patients struggling with epididymitis on the hind end of testicle intended for the storage and passage of the sperms (epididymo- architis) [19].

2.6 Cryptorchidism

Crptorchidism is a serious developmental disorder while in either one or both the testes fail to descend into the scrotum from abdomen [19]. It is the most common defect of the male reproductive tract pooled in the scientific literature. Almost

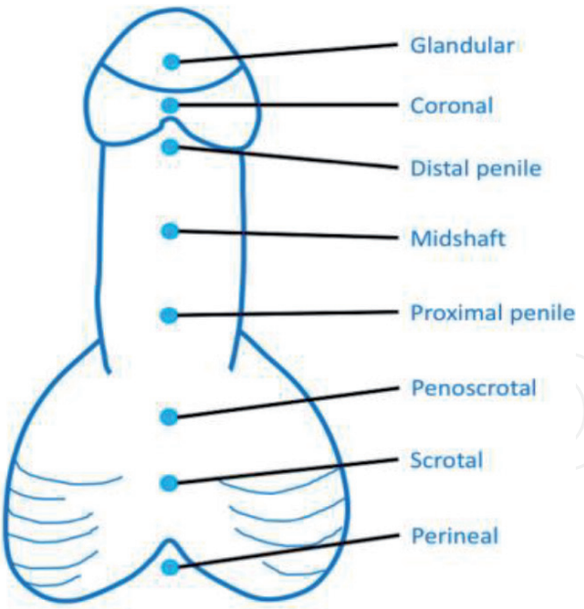

Figure 1.
Hypospadiasis. Image source, Charles G Macias, 2015 (International journal of pediartics endocrinology).

3% of full term and 30% of premature infant boys have been reported to born with at least one undescended testis. Absent testis from usual scrotal position can be present anywhere along the path of the descent, in the inguinal canal, ectopic, hypo plastic or dysgenetic.

2.7 Bilateral congenital anorchia

Congenital anorchia often called as prepubertal castrate or vanishing testis syndrome. It is a condition with one or both testes absent in the otherwise normal male (phenotypically and genotypically) [20]. The prevalence of bilateral congenital anorchia is reported to be 1 in 20,000 and that of unilateral congenital anorchia being 1in 5000 males. Anorchia is a case of absence of testicular tissue, monorchia a condition in which only one testis is absent and polyorchia although exceedingly rare refers to the presence of one or more supernumerary testis.

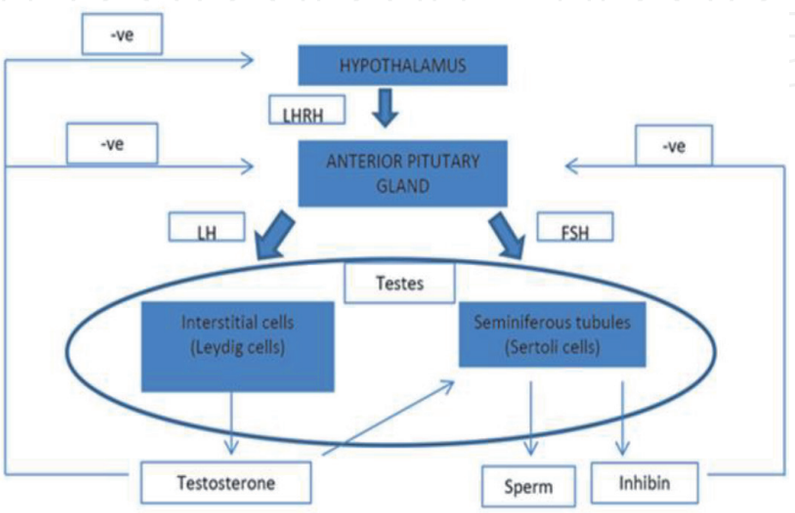

Figure 2.
The hormonal role in reproductive development. https://www.urologynews.uk.com/features/features/post/male-infertility.

2.8 Hormonal defects

The reproductive hormone axis of males often called as hypothalamic–pituitary axis keeps three important domains. Hypothalamic, pituitary and testicular glands (gonad axis) [21]. The axis regularly works to provide the optimum concentration of hormones much required for smooth reproductive development of males. **Figure 2** sums up the role of hormones in the reproductive development of human males. Malfunction of this system pave way to infertility. Absence of the normal levels of hormones like GnRH leads to the lack of testosterone and is potent enough to cause a group of disorders like hypogonadotrophic hypogonadism [22]. One of the common examples in this case is Kallman syndrome, linked with impaired sense of smell and immaturity. Another common defect that occurs in the gonadal axis includes the inability of pituitary to produce the required levels of luteinizing hormones and Follicular stimulating Hormone that impairs the stimulation of the testes and has direct bearings on the production of the sperms and testosterone [23].

3. Life style and male infertility

There has been an association established between the life style factors and male infertility. Factors like the dietary measures, smoking, regular exposure to hot surfaces, common insomnia, liquor boozing, advanced ages, illicit drugs, obesity and prolonged exposure to the mobile phone led electromagnetic radiation play vital roles in causing male infertility [4].

3.1 Smoking

Smoking pays heavily with the fertile health of the man. Cigarette has addictive ingredients like nicotine, tar, carbon monoxide, polycyclic aromatic hydrocarbons or benzene like volatile organic compound besides heavy metals like cadmium and lead [24]. Smoking is associated with the deterioration of semen quality. Smokers have raised levels of reactive oxygen species (ROS) at levels that can overpower the cell anti oxidant defenses [25]. With increase in ROS the spermatozoa is exposed to oxidative stress that causes the impairment in the sperm physiology that ultimately ends up in infertility. **Figure 3** shows the role of ROS in impairing the male infertility. Without the activation of (ChK1), the overall decline in sperm repairing is affected by large [26].

It ultimately leads to increase in the sperm apoptosis, thereby compromising semen quality. The paternal smoking prior to conception proves an increased risk for various developmental disorders in the offspring. During the pregnancy time maternal smoking potentially causes severe effects on male offspring fertility by lessen the germ cell population.

3.2 Alcohol

Alcohol action on male reproductive system is through hypothalamus- pituitary-gonadal axis (HPG). Alcohol impairs the production of hormones like GnRH, FSH, LH and testosterone besides impairing the function of leydig and Sertoli cells [27]. All this leads to the impaired development of spermatozoa. Acute ethanol intake affects the testicular Steriodogenic activities; it further has a negative impact on the anti oxidant enzyme activities resulting in response to the raised oxidative stress. Studies also reveal the link between the alcohol administration by male partners in couples facing the primary infertility and sperm Terotogeny. **Figure 4** summarizes the role of Alcohol in impairing the production of hormones.

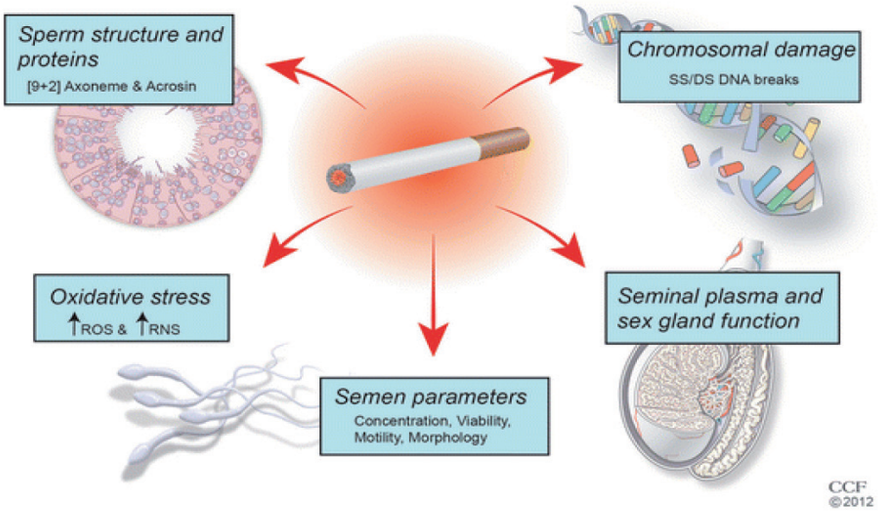

Figure 3.
The effects of smoking on male infertility. Adapted from, Omar Haque Joseph A. Vitale Ashok Agarwal Stefan S. du Plessis.

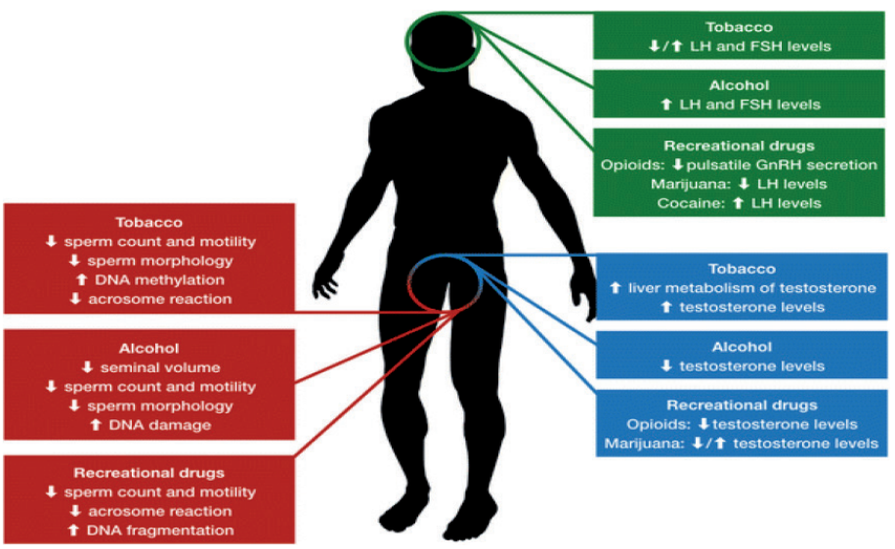

Figure 4.
The role of alcohol in impairing the production of hormones. Image source, Andrea Sansone reproductive biology and endocrinology volume 16, Article Number 3(2018).

3.3 Drugs

Drugs like Marijuana, narcotics and anabolic –androgenic steroids (AAS) have a negative correlation with male infertility [27]. These recreational drugs as we count them have adverse impact history on HPG axis, testicular anatomy and sperm functioning. Marijuana Phytocannabinoids obstructs the cannabinoids in binding with the cannabinoid and vaniloid receptors that negatively influences the ECS (Endogenous cannabinoid system) and thereby consequently impair male infertility [28].

3.4 Anaboilic androgenic steroids

Anabolic Androgenic steroids (AAS) are used by males to boost the sport activity or athletic performance. The AAS induced hypogonadism has seen a surge among young men over years [28]. Increased levels of Testosterone due to administration of AAS imply a negative feedback on hypothalamic –pituitary gonad axis leading to the containment of spermatogenesis, testicular atrophy and finally infertility [29].

It further results in the transitory Azoospermia with a recovery period of no less than two years. Besides inducing the Azospermia, Anabolic Androgenic Steroid abuse also promote the failure of libido besides erectile dysfunction.

3.5 Obesity

Despite the advances in understanding the male infertility, studies show the 30% of male infertility corresponds to idiopathic sperm abnormalities [30]. Important to mention here that a variety of conditions affect semen parameters- Medical condition like liver failure,renal diseases, cystic fibrosis, chronic obstructive pulmonary disease are few names to be mentioned here. The Medical etiologies impact fertility and therby causes the effects on hormonal levels, sexual function or testicular function and spermatogenesis. In maintaining the quality semen parameters, sexual function and fertility potential man's state of health needs to be optimized by large. Obesity is linked with male infertility primarly and mainly due to hormonal changes. Bierick et al. has come up with an inverse relationship between body mass index (BMI) and testosterone, testosterone to estradiol, ejaculate volume, sperm concentration and morphology. In this regard many authors reported higher rates of Azospermia and oligospermia among obese men compared with men of normal weight. It is also pooled in the literature that couples with a female partner of normal BMI and obese male partner are more susceptible to have prolonged time to conceive compared with couples with male partners of normal weight. Studies also bring on forth that couples with an obese male partner seeking Assisted reproductive technology (ART) have decreased pregnancy rates and increased pregnancy lost mainly because of prevalent DNA fragmentation [31].

Mass Adipose tissue in obese individuals leads to conversion of testosterone to estrogen which potentially affects the HPG axis therby causing the reduction in the release of gonadotrophin [32]. Apart from this, the raised leptin production by white adipose tissue causes the fall in testosterone production. Further studies reveal the increased scrotal adiposity as one of the major reasons of testicular heat stress and causes oxidative stress. It can potentially impair the spermatogenesis, integrity of DNA and sperm-oocyte interaction.

3.6 Diet

Diet plays an instrumental part in maintenance of semen quality. There is amble evidence in literature supporting the fact that balanced diet improves the rates of semen quality and fecundity in males. Diet can have either the Mediterranean, western or prudent composure. While former is enriched with omega-3 fatty acids, antioxidants, vitamins and low in saturated and trans-fatty acids [33]. All these are collectively and inversely related to the low semen quality. A more prudent diet that largely comprises of white meat, fruits and vegetables is positively associated with the overall wellbeing of sperms.

4. Environment and male Infertility

Relating environment to the infertility is not a new measure, it is a known fact that our environment is contaminated [34]. The natural and synthetic chemicals obviously interact with the endocrine system. Studies reveal the potential of some substances in inhabiting the specific enzymes in Steriodogenesis like ketoconazole and cyanoketone. In the synthesis of epoxy resins and poly carbonate, Bisphenol A (BPA) is widely used so is potent enough in causing harm to the fertility in men.

BPA is involved in designing of the plastic bottles often used in containers meant for beverage and water storage. Acting as a metabolic and endocrine disruptor, BPA can imitate the action of endrogen estrogen. Studies mention the presence of partial doses leading to the precocious puberty. In some cases even the prostatic hyperplasia and low sperm count has been recorded as a result of exposure to bisphenol. The other severe factor that is established to be hazardous to the reproductive health of men is the exposure to heavy metals. The pooled data available in literature reveals that even the trace concentration due to contaminated water or food can accumulate in the body. Surveys reveal the hostility of heavy metals like lead (Pb), Mercury (Hg) and cadmium (Cd) with the male reproductive system [35]. It impairs the hypothalamic–pituitary axis therby spermatogenesis that leads to impaired semen quality.

Another risk factor that has surfaced in the scientific literature is agricultural related pesticides. Prolonged exposure to the pesticides and other chlorinated hydrocarbons affects the reproductive system. The very parameters of sperm density and motility, mitochondrial DNA, sperm morphology are affected by exposure to these chemicals [36]. There have been evidences reported about the enormous risk of fetal death from congenital anomalies, particularly where father is having the longer exposure to the common agricultural use pesticides. Pesticide exposure affects the fertilizing ability of sperm even in men seeking IVF treatment.

5. Genetic factors and male infertility (Y chromosome infertility)

15 percent of male infertility cases have genetic factors associated either with the chromosomal abnormality or single –gene mutations. Men with Azospermia have reported chromosomal abnormalities in 14% of cases [37]. The most common being the Klinefelter syndrome, 47, XXY leads to the impaired spermatogenesis. Patients with severe oligozoospermia show translocation, the most common being the Robertson and Bilateral translocation. Autosomal inversions are almost eight times seen in the men with infertility issues. Y chromosome deletions in the long arm region termed AZF mostly occur in Azospermic men. **Figure 5** showing the AZF region with three zones AZFa, AZFb, AZFc, micro deletion occur in palindrome sequences. Y chromosome micro deletion affects the 10% of infertile men [1]. Deletion of AZFa results in the sertoli cell phenotype. Intra AZFb deletion is prevalent in Azospermic men. Deletions corresponding to AZFc region are most severe and can lead to the issues like sertoli cell syndrome and Oligospermia. Some gene mutations with pathological syndrome are also involved in the male infertility. In cases of severe testiculopathies in infertile men deletions pertaining to the long arm on Y chromosome are commonly reported in the available literature.

5.1 Primary ciliary dyskinesia (PCD)

PCD is a blanket term most commonly used to describe a condition of many closely related disorders caused due to the impaired motility of Ciliary Structures [39]. Although not obligatory but it has been reported in the literature that affected males suffer infertility mainly due immotile spermatozoa. Important to mention here that Ultra structural defects are mainly due to the absence of dynin arms and malformed radial spokes.

5.2 Kartagener syndrome

Men suffering from KS syndrome have joint disorders like bronchiectasis, Chronic Sinusitis and Sperm immotility. Kartagener syndrome is often recognized

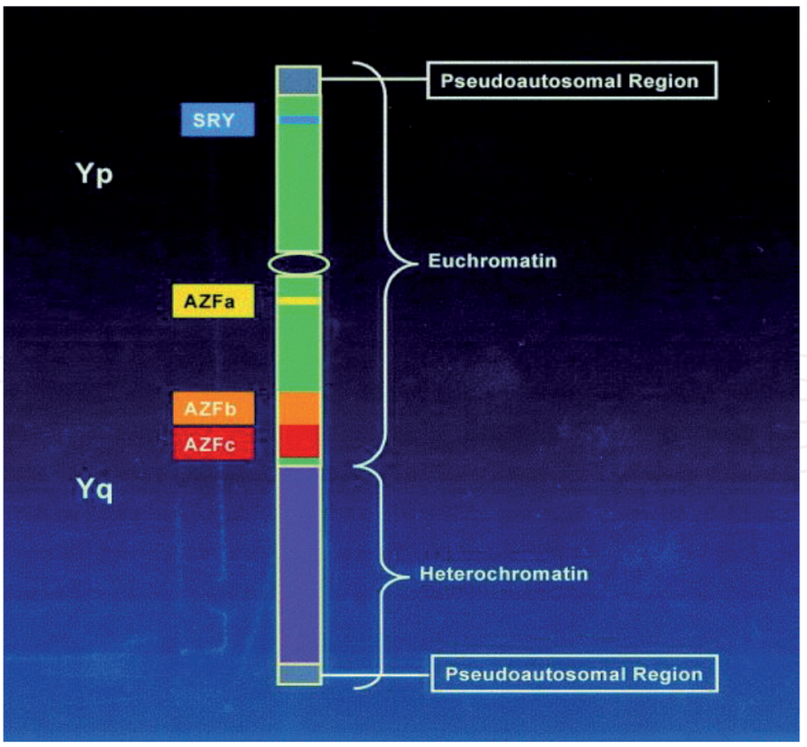

Figure 5.
Structure of Y chromosome [38].

as a subset of a larger Ciliary disorder. In this syndrome the genetic defects leads to impaired Ciliary motility mainly responsible for causing recurrent chest and ear infection besides infertility has also been reported in the scientific literature [40].

5.3 Persistent mullerian duct syndrome

It is seen during the early embryonic development that regression of Mullerian duct is mediated mainly due to the anti-mullerian hormone (AMH) often called as Mullerian inhabiting substance (MIS) [39]. Gene for this hormone has been mapped to 19p13 and mutations in it can cause the persistent Mullerian syndrome. Normally virilised Men with persistent Mullerian duct syndrome show the presence of both fallopian tubes and a uterus.

5.4 Aarskog-Scott syndrome

Aarkskog-Scott syndrome is an X-linked recessive disorder with genital, facial and skeletal abnormalities. Affected men also possess facial features including hypertelorism, eyelid ptosis, irregular auricular shape with prominently broad nasal bridge. Other features associated with Aarskog –scott syndrome are cryptorchidism, subfertility, mild cutaneous syndactyly [41].

5.5 Kallmann syndrome

Kallman syndrome affected ones show characteristic combination of anosmia and hypogonadotrophic hypogonadism [42]. Affected men show impaired secretion of GnRH (Gonadotrophic releasing hormone) with low concentration of follicle stimulating hormone (FSH) and testosterone. Some other complications of men suffering with Kallman syndrome are unilateral renal aplasia, mirror movements of extremities and pescavas. Unilateral renal aplasia is a commonly seen in affected men, kidney tends to be hypertrophied, ectopic and likely to contract infection. The

inheritance pattern of Kallmann syndrome is X-linked recessive in mo st families. Gene corresponding to KS (X –linked) is mapped to Xp22.3 with 200000 bp genomic DNA.

5.6 Leydig cell hypoplasia

Development of male genitals begins at the 9th week of gestation. Fetal leydig's cells are stimulated by human chorionic gonadotrophin (hCG) to secrete the male sex hormone testosterone [43]. With the progress in the pregnancy towards the later stage, the very function of hCG is taken over by luteinizing hormone. Leydig cell hypoplasia is a rare disorder in which the fetal leydig's cells turn insensitive to the hCG. It results in the feminization of the external genitials. LHCGR gene with eleven exons is found to be involved in it.

5.7 XY gonadal dysgenesis

XY gonadal dysgenesis also called as swyer syndrome. It is a type of hypogonadism with 46,XY karyotype. People with this syndrome have non-functional gonads. Affected ones are born with the appearance of a normal female on anatomical aspects with an exception of having non functional gonads [42] With their body producing no noticeable changes before puberty, defects in reproductive system remains unsuspected until no puberty is evident. Usually they are being considered as the girl child until they fail to have menstrual periods (primary amenorrhea). Major consequences of XY gonadal dysgenesis if left without treament are severe. Deprivation of estrogen in affected ones leads to the underdevelopment of breasts and uterus. Gonads miserably fail to produce progesterone and thereby lead to the unpredictable menstrual periods. Ovulation too is not seen, so conceiving children too is not possible unless and until there is an intervention [44].

6. Recent reports

The recent reports suggest the possibilities of undiagnosed but potentially treatable defects of male infertility. With adequate investment in the DNA, RNA and protein research, the percentage of the patients being classified as cases of idiopathic can be brought down.

6.1 Advanced sperm tests

Sperm owe various internal components that are very important for normal embryo development and pregnancy in general. Out of these internal features DNA is one of the primary to be discussed here, DNA is conventenally used to resolve the cause for the infertility when other examination or tests fail to deliver. At present, DNA is being evaluated in clinics in two different ways. Determining Y chromosome deletions (Y-micro deletion) and screening the appearance or chromosome numbers by karyotyping [45]. Only some abnormalities in sperm DNA can be diagnosed using these tests. So, additional DNA tests are eqally important for proper diagnostics. Other advanced tests analyze DNA: DNA fragmentation and oxidative stress. DNA fragmentation assessment can benefit couples that have not had success with previous IVF/ICSI cycles or have had repeated miscarriages.

6.2 Magnetic assisted cell sorting (MACS)

Magnetic assited cell sorting help in selecting sperm with high-quality DNA, and retrieval of testicular sperm (known as testicular sperm extraction, TESE, or testicular sperm aspiration, TESA) to be later used with ICSI (intra cytoplasmic sperm injection) [46].

6.3 Male oxidative stress disorder (MOSI)

In case an Oxidative stress is suspected, most often oral antioxidant therapy is employed. Both DNA fragmentation and oxidative stress tests are being validated by the contemporary studies [47]. This advanced format of sperm testing of DNA provides the detailed information towards the understanding of overall health and function of the sperms.

6.4 Experimental sperm tests

Diagnostic experimental tests focusing on recently discovered essential sperm components are being designed and investigated by scientists [48].

6.5 RNA: sperm transcripts

Sperm head, nucleus, and residual cytoplasm of the sperm are known regions that possess RNAs (RNA elements and messenger RNA). Sperm RNA is concerned in regulating the epigenetic code of the embryo. Currently no treatment is available for defects in the RNAs that can corner the disease, but it does provide an important clue in understanding the concern of infertility [49].

6.6 Proteins: sperm proteome

Sperm being transcriptionally and translationally inert cells are always dependent on already existing proteins. Using mass spectroscopy one can identify the sperm proteome which can play an important role in determining status of male fertility [50]. A Deviant or aberrant expression of sperm proteins influence molecular dynamics associated with the overall motility, sperm capacitation, acrosomal reaction, and sperm-oocyte interaction in unexplained male infertility cases. Identifying deficiencies in the expression or function of any protein may be resolved by introducing the protein itself, its DNA, or RNA during ICSI.

6.7 Activation factors

Phospholipase C zeta (PLCζ) an oocyte activation factor in human reproductive biology, are a type of sperm protein play an crucial role in initiating embryo development. Deficiencies in PLCζ can be treated with Ca2+, which increases ICSI treatment outcome.

6.8 Clinical prespective

Experts of reproducive health have an important goal while identifying male infertility with the use of standard clinical or experimental diagnostics. It includes the identification of aberrant anatomical features or treatable causes like oxidative stress and DNA fragmentation or any irreversible conditions that could still be

treated with ART, defects in the RNA and centrioles. The indepth understanding the underlying cause of male infertility may change the course of action for couples that have had several rounds of failed ART treatment. Fertility preservation is yet another option available where eggs can be freezed to give clinicians the wrist to correct the male infertility. As such these future diagnostic tests may be relevant even if there are no obvious treatment strategies because it may help the experts predict the productivity of ART.

6.9 Y-chromosome microdeletion (YCM)

Genes located in the Y chromosome are involved in important male fertility related functions like spermatogenesis, endocrine and physiological factors. The microdeletions sites are located on q arm of Y chromosome, specifically Azoospermia Factor (AZF) region, hence called Yq microdeletions. These deletions are mostly in the form of complete/incomplete, recombination; mutations and Copy Number Variations (CNV) and vary in frequency depending on region, ethnicity, lifestyles and other epigenetic factors. Available data on thousands of Y chromosome analysis reveal that the frequency of microdeletions are affected by sample size, selection criteria of subjects, different geographical regions, ethnicity, Oxidative Stress (OS), Deoxyribonucleic Acid (DNA) fragmentation and food styles in addition to genetic defects. It has been hence noticed that screening of Yq microdeletion is an important criterion and its correlation with spermeograms is very necessary to infer degree of infertility in men [51]. Such cases strongly suggested to undergo genetic counseling before adoption of ARTS as deletions increase risk of genetic anomalies, low birth weight and congenital malformations in New Births (NB) of Intracytoplasmic Sperm Injection and Testicular Sperm Ejaculates (ICSI/TESE) adopted cases. Thus, Y deletion evaluation reckons the diagnosis of type of male infertility and its prevention in the next generation propagation through ARTs.

7. Conclusion

Patients who aspire to seek the reproductive assistance to achieve parenthood need to go through a mandatory, systematic clinical screening. The evaluation of patients for infertility demands a comprehensive medical history that includes the basic physical examination to rule out the possibilities of anatomical constraints if any. A review of the past medical record, congenital abnormalities, previous conception, environmental exposure besides molecular and cytogenetic assay must be taken a serious note of before opting for ART. This chapter is only a small step rather a precise attempt towards the understanding of problem of male infertility for promising ART.

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