



## Understanding Erectile Dysfunction

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### Introduction

In this era of information abundance, question of a man's potency is raised more and more in matrimonial as well as medico legal and criminal issues. A husband is brought to court of law for potency test in cases of unconsummated marriage seeking nullity of marriage. But potency test is not cent percent full proof. Male genital organ may react differently to varying situations. A man may get an erection in relation with one woman and may not experience the same with another woman. It depends a lot on the psychology of the person.

### Definition of Erectile Dysfunction

In literature, various definitions for erectile dysfunction have been used. Impotency is the inability to achieve or maintain an erection long enough to engage in sexual intercourse. Erectile Dysfunction (ED) or impotency is the consistent inability to obtain or maintain an erection for satisfying sexual relations. Impotency or sexual incapacity connotes physical incapability to accomplish sex act. Impotency in male is the persistent inability to develop or maintain a penile erection sufficient to conclude coitus to orgasm and ejaculation.

Halbury's laws in England describe impotence to be such a state of mental or physical condition which makes



consummation of marriage a practical impossibility.

Erection is a physiological process. Three broad processes have been involved in causation of erection in males.

1. Genital stimulation- (reflexogenic)
2. Central stimulated (noncontact or psychogenic)- results from mental, fantasy, visual, and auditory stimuli)
3. Central Originated - Nocturnal Penile Tumescence (NPT): exact mechanism is not known.

Erection involves sinusoidal relaxation, arterial dilation, and venous compression. During erection, the arterial flow increases in both corpora in a similar manner; however the pressure in corpous spongiosum and glans is only one third to one half that of in corpora cavernosa.

## **Causes of Erectile Dysfunction**

For understanding ED and ruling out different causes of it, detailed history and physical examination is essential before going for further tests.

Impotency can be primary or secondary. Primary impotency is a condition in which the patient has consistently failed to achieve satisfactory vaginal penetration throughout his life span. Secondary impotency one occurs after the man has successful in intercourse on at least one occasion in past.

**A. Psychological:** Performance anxiety, religious orthodoxy, sexual phobias or deviation, depression, lack of physical attraction or poor body image, concern over aging, lack of knowledge of physiological changes with age etc.

### **B. Neurogenic dysfunction:**

The pathology may lie at brain or spinal cord or peripheral nerves.



1. Brain (tumors, epilepsy, Stroke, Parkinsonism, Alzheimer disease)

2. Spinal cord (spina bifida, disc herniation, syringomyelia, cord tumor, tabes dorsalis, multiple sclerosis)

3. Cutaneous, peripheral, and terminal nerve endings and receptors (Diabetes mellitus, chronic alcohol consumption, vitamin deficiency, direct injury, post radical prostatectomy)

#### **C. Hormonal:**

1. Diabetes mellitus (mostly due to a combination of vascular, neurological, and psychological factors).

2. Hypogonadism: however one can get visual stimuli erections. The best indicator of androgen status is the calculated bioavailable testosterone (free testosterone and albumin bound testosterone).

3. Hyperprolactinemia

4. Hypo / Hyper thyroidism

5. Cushing syndrome

6. Addison disease

**D. Arterial:** Extra penile and intra penile – atherosclerosis, narrowing / stenosis of artery etc.

#### **E. Cavernosal (venous):**

Type I – Large veins exit through corpus cavernosum (probably congenital)

Type II – Venous channels are enlarged as result of distortion of tunica albuginea (peyroni's disease or associated with aging)

Type III – Cavernosal smooth muscle is unable to relax because of fibrosis, degeneration, or dysfunction of gap junctions.

Type IV - Endothelial dysfunction

Type V - Abnormal communication between corpus cavernosum and corpus spongiosum.

**F. Systemic/other diseases:** Renal failure, recent recovery from myocardial



infarction, pulmonary emphysema and dyspnoea, Colostomies / ileostomies, cirrhosis of liver, scleroderma, Debilitation, cachexia etc.

**G. Drugs:** Hypertensives, alpha adrenergic blockers, beta blockers, antidepressants, estrogens, spiranolactone, anti-androgens, alcohol, digoxin, marijuana, narcotics, smoking, radiotherapy, chemotherapy etc.

**H. Iatrogenic:** if priapism occurs after papaverine injection and is not reversed within 3-4 hours.

### **How to approach the problem of ED?**

1. A detailed medical, personal and social history
2. A thorough physical examination
3. CBC, renal, hepatic function, FBS & PPBS, TSH, Serum testosterone, prolactin
4. Penile thermal sensory testing
5. Psychological Evaluation

6. Radioisotope Penography: using <sup>99m</sup>Tc labeled red blood cells

7. Penile Magnetic Resonance Imaging

8. Penile near infrared spectrophotometry

9. NPT Electro bio impedance is a device introduced recently that assess volumetric changes in penis during nocturnal erections.

10. Dynamic infusion Cavernosometry.

11. Penile Plethysmography: penile pulse volume recording.

12. Pharmacologically Induced Penile Erection (PIPE): Intra-cavernosal injection (with or without sexual stimulation can be used to establish potency) of papaverine 60 mg or Prostaglandin E1 10 microgram – or 10 microgram of alprostadil or phentolamine (or a bimix or trimix of them) a negative response (no erection or partial erection) is not diagnostic. However if the patient



develops a fully rigid erection within 12 minutes of injection and is sustained for more than 30 minutes, adequate arterial flow and intact venous mechanism can be assumed. Rarely psychological apprehension can affect the patient's response. After injection of 30 ml of papaverine, or 10 microgram of PGE1, and manual genital stimulation, rapid detumescence within 5 minutes is diagnostic of an incompetent veno-occlusive mechanism. Artificial erection doesn't prove degree of sexual desire, and whether he can get erection without the injection. The priapism risk with papaverine injection is 30%. Contraindications for intra-cavernosal papaverine are- psychological instability, history or risk of priapism, history of severe coagulopathy, unstable cardiovascular disease, use of monoamine oxidase (MAO) inhibitor

because of risk of precipitating life threatening hypertension in the event that an intra-cavernosal alpha adrenergic agonist is used to reverse priapism episode. MUSE (medicated urethral system for erection) uses synthesized PGE1 as a suppository inserted in to the urethra.

13. Penile colour Doppler study- Intra-cavernosal injection of papavarine or prostaglandin is used to stimulate an erection. Doppler measurements are obtained near the base of the penis. The peak systolic velocity in the cavernosal arteries is a reliable indicator to predict arterial insufficiency. Normal individuals have peak systolic velocity of 30 cm / sec or more.

14. Phallangio-arteriography

15. Oral medication – sildenafil, tadalafil, phentolamin, Yohimbine etc. helps only to maintain erection or hold a naturally



achieved erection. The medicine doesn't help a man to get an artificial erection. They do not improve desire, urge or libido.

16. Audiovisual and vibratory stimulation: Erotic stimulation by explicit videotape material with monitoring has been used as a reliable as well as time- and cost effective alternative to NPT recording for differentiating between organic and psychogenic ED presentation. It is also considered more physiologic, consistent with erectile behavior when awake. The testing has potential limitations, with false negative responses occurring in presence of endocrine abnormalities and false positive response occurring in psychological situations such as erotic excitement inhibition.

17. Neuroimaging: Records the penile rigidity resistance

18. Biothesiometry: assess afferent sensory function.

19. Nocturnal Penile Tumescence (NPT): There occurs physiological penile tumescence during the periods of REM sleeps. The cause of this NPT is not known with certainty. One hypothesis says that the noradrenergic neurons of locus ceruleus are inhibiting to penile erection, and that the cessation of their discharge that occur during REM sleep may allow testosterone related excitatory actions to manifest as NPT. Rigiscan is one of the most reliable tests commonly used to monitor NPT. It is an automated, portable device used for NPT response, which combines the monitoring of radial rigidity, tumescence, number, and duration of erectile events. A case is considered normal if during an eight hours sleep, the best event of NPT had equal to or more than 30 % rigidity at



both tip and base of the penis with an increase in tip tumescence equal to or more than 2 cm, and in base tumescence equal to or more than 3 cm with activity in base and tip synchronous and maintained for at least 10 minutes. Another study say it to be normal if 4-5 erection episodes per night, mean duration than 30 minutes, an increase in circumference of more than 3 cm at the base and tip, and maximal rigidity greater than 70%, at both base and tip. If NPT is detected, then the ED/impotence is presumed to be due to psychological illness such as sexual anxiety, if not then it is presumed to be due to physical cause. Rigiscan monitoring proves that men get natural erections in sleep as a physiological response (and not due to an erotic dream) and thus he is capable of getting spontaneous erections. This is

the only test that can be considered close to potency test, however this test too doesn't say about the sexual desire, urge, inclination or libido of a person. The major criticism of Rigiscan is lack of sleep quality documentation. Its potential limitations include the fact that radial rigidity does not accurately predict axial rigidity.

### **Conclusion**

Utmost care should be taken to diagnose a case of impotency. There are many sophisticated diagnosing tools available for reaching a conclusive decision. Once the diagnosis is made, treatment can be planned accordingly. It should be remembered that most cases of impotency are due to psychological causes and can be treated by proper counselling.

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