Erectile Dysfunction

Erectile dysfunction (ED) or (male) impotence is a sexual dysfunction characterized by the inability to develop or maintain an erection of the penis. There are various underlying causes, such as cardiovascular leakage and diabetes, many of which are medically treatable.

The causes of erectile dysfunction may be physiological or psychological. Physiologically, erection is a hydraulic mechanism based upon blood entering and being retained in the penis, and there are various ways in which this can be impeded, most of which are amenable to treatment. Psychological impotence is where erection or penetration fails due to thoughts or feelings (psychological reasons) rather than physical impossibility; this can often be helped. Notably in psychological impotence there is a very strong placebo effect.

Erectile dysfunction, tied closely as it is to cultural notions of potency, success and masculinity, can have devastating psychological consequences including feelings of shame, loss or inadequacy; often unnecessary since in most cases the matter can be helped. There is a strong culture of silence and inability to discuss the matter. In fact around 1 in 10 men will experience recurring impotence problems at some point in their lives.

Folk remedies have long been advocated, with some being advertised widely since the 1930s. The introduction of the first pharmacologically approved remedy for impotence, sildenafil (trade name Viagra), in the 1990s caused a wave of public attention, propelled in part by heavy advertising.

The Latin term impotentia coeundi describes simple inability to insert the penis into the vagina. It is now mostly replaced by more precise terms. The study of erectile dysfunction within medicine is covered by andrology, a sub-field within urology.

Overview and symptoms

Erectile dysfunction is characterized by the regular or repeated inability to obtain or maintain an erection. There are several ways that erectile dysfunction is analyzed:

* Obtaining full erections at some times, such as when asleep (when the mind and psychological issues if any are less present), tends to suggest the physical structures are functionally working. However the opposite case, a lack of nocturnal erections, does not imply the opposite, since a significant proportion of sexually functional men do not routinely get nocturnal erections or wet dreams.

* Obtaining erections which are either not rigid or full (lazy erection), or are lost more rapidly than would be expected (often before or during penetration), can be a sign of a failure of the mechanism which keeps blood held in the penis, and may signify an underlying clinical condition, often cardiovascular in origin.

* Other factors leading to erectile dysfunction are diabetes mellitus (causing neuropathy) or hypogonadism (decreased testosterone levels due to disease affecting the testicles or the pituitary gland).

Erection problems are very common. The Sexual Dysfunction Association estimates that 1 in 10 men in the UK have recurring problems with their erections at some point in their life.

Pathophysiology

Penile erection is managed by two different mechanisms. The first one is the reflex erection, which is achieved by directly touching the penile shaft. The second is the psychogenic erection, which is achieved by erotic stimuli. The former uses the peripheral nerves and the lower parts of the spinal cord, whereas the latter uses the limbic system of the brain. In both conditions an intact neural system is required for a successful and complete erection. Stimulation of penile shaft by the nervous system leads to the secretion of nitric oxide (NO), which causes the relaxation of smooth muscles of corpora cavernosa (the main erectile tissue of penis), and subsequently penile erection. Additionally, adequate levels of testosterone (produced by the testes) and an intact pituitary gland are required for the development of a healthy male erectile system. As can be understood from the mechanisms of a normal erection, impotence may develop due to hormonal deficiency, disorders of the neural system, lack of adequate penile blood supply or psychological problems. Restriction of blood flow can arise from impaired endothelial function due to the usual causes associated with coronary artery disease, but can also include causation by prolonged exposure to bright light or chronic exposure to high noise levels.

A few causes of impotence may be iatrogenic (medically caused). Various antihypertensives (medications intended to control high blood pressure) and some drugs that modify central nervous system response may inhibit erection by denying blood supply or by altering nerve activity. Psychiatric medications, especially SSRIs have been shown to cause erectile dysfunction in patients. Although usually reversible, these sexual side effects can, in rare cases, last for months or years or permanently after the drug has been completely withdrawn. This disorder is known as Post SSRI Sexual Dysfunction.

Surgical intervention for a number of different conditions may remove anatomical structures necessary to erection, damage nerves, or impair blood supply.Complete removal of the prostate gland or external beam radiotherapy of the gland are common causes of impotence; both are treatments for advanced prostate cancer. Some studies have shown that male circumcision may result in an increased risk of impotence, while others have found no such effect, and another found the opposite.

Excessive alcohol use has long been recognised as one cause of impotence, leading to the euphemism "brewer's droop," or "whiskey dick;" Shakespeare made light of this phenomenon in Macbeth.

A study in 2002 found that ED can also be associated with bicycling. The number of hours on a bike and/or the pressure on the penis from the saddle of an upright bicycle is directly related to erectile dysfunction.

Diagnosis

Medical diagnosis

There are no formal tests to diagnose erectile dysfunction. Some blood tests are generally done to exclude underlying disease, such as diabetes, hypogonadism and prolactinoma. Impotence is also related to generally poor physical health, poor dietary habits, obesity, and most specifically cardiovascular disease such as coronary artery disease and peripheral vascular disease.

A useful and simple way to distinguish between physiological and psychological impotence is to determine whether the patient ever has an erection. If never, the problem is likely to be physiological; if sometimes (however rarely), it could be physiological or psychological. The current diagnostic and statistical manual of mental diseases (DSM-IV) has included a listing for impotence.

Clinical Tests Used to Diagnose ED

Duplex ultrasound
Duplex ultrasound is used to evaluate blood flow, venous leak, signs of atherosclerosis, and scarring or calcification of erectile tissue. Injecting prostaglandin, a hormone-like stimulator produced in the body, induces erection. Ultrasound is then used to see vascular dilation and measure penile blood pressure. Measurements are compared to those taken when the penis is flaccid.

Penile nerves function
Tests such as the bulbocavernosus reflex test are used to determine if there is sufficient nerve sensation in the penis. The physician squeezes the glans (head) of the penis, which immediately causes the anus to contract if nerve function is normal. A physician measures the latency between squeeze and contraction by observing the anal sphincter or by feeling it with a gloved finger inserted past the anus. Specific nerve tests are used in patients with suspected nerve damage as a result of diabetes or nerve disease.

Nocturnal penile tumescence (NPT)
It is normal for a man to have five to six erections during sleep, especially during rapid eye movement (REM). Their absence may indicate a problem with nerve function or blood supply in the penis. There are two methods for measuring changes in penile rigidity and circumference during nocturnal erection: snap gauge and strain gauge. (It should be noted that a significant proportion of men who have no sexual dysfunction nonetheless do not have regular nocturnal erections.Thus presence of NPT tends to signify physically functional systems, but absence of NPT may be ambiguous and not rule out either cause.)

Penile biothesiometry
This test uses electromagnetic vibration to evaluate sensitivity and nerve function in the glans and shaft of the penis. A decreased perception of vibration may indicate nerve damage in the pelvic area, which can lead to impotence.

Penile Angiogram

Invasive test - allows visualization of the circulation in the penis and is used during the repair of a priapism.

Dynamic Infusion Cavernosometry
(Abbreviated DICC) technique in which fluid is pumped into the penis at a known rate and pressure. It gives a measurement of the vascular pressure in the corpus cavernosum during an erection. To do this test, a vasodilator like prostaglandin E-1 is injected to measure the rate of infusion required to get a rigid erection and to help find how severe the venous leak is.

Corpus Cavernosometry
Cavernosography measurement of the vascular pressure in the corpus cavernosum. Saline is infused under pressure into the corpus cavernosum with a butterfly needle, and the flow rate needed to maintain an erection indicates the degree of venous leakage. The leaking veins responsible may be visualised by infusing a mixture of saline and x ray contrast medium and performing a cavernosogram.

Digital Subtraction Angiography
In DSA, the images are acquired digitally. The computer creates a mask from lower-contrast x-rays of the same area and digitally isolates the blood vessels (this is done manually through darkroom masking with traditional angiography).

Magnetic resonance angiography (MRA)
This is similar to magnetic resonance imaging. Magnetic resonance angiography uses magnetic fields and radio waves to provide detailed images of the blood vessels. Doctors may inject a "contrast agent" into the patient's bloodstream that causes vascular tissues to stand out against other tissues. The contrast agent provides for enhanced information regarding blood supply and vascular anomalies. Aside from the IV used to introduce the contrast material into the bloodstream, magnetic resonance angiography is noninvasive and painless.