

ERECTILE DYSFUNCTION

By

DR.AHMED MAHMOUD REYAD



PHYSIOLOGY OF PENILE ERECTION

Innervation of the penis:

- Parasympathetic innervation (s2-s4)
- sympathetic innervation (T12-L2)
- Somatic innervation (S2-S4) has motor and sensory Function

The brain has a modulatory effect on the spinal pathways of erection by hypothalamus, midbrain and medulla.

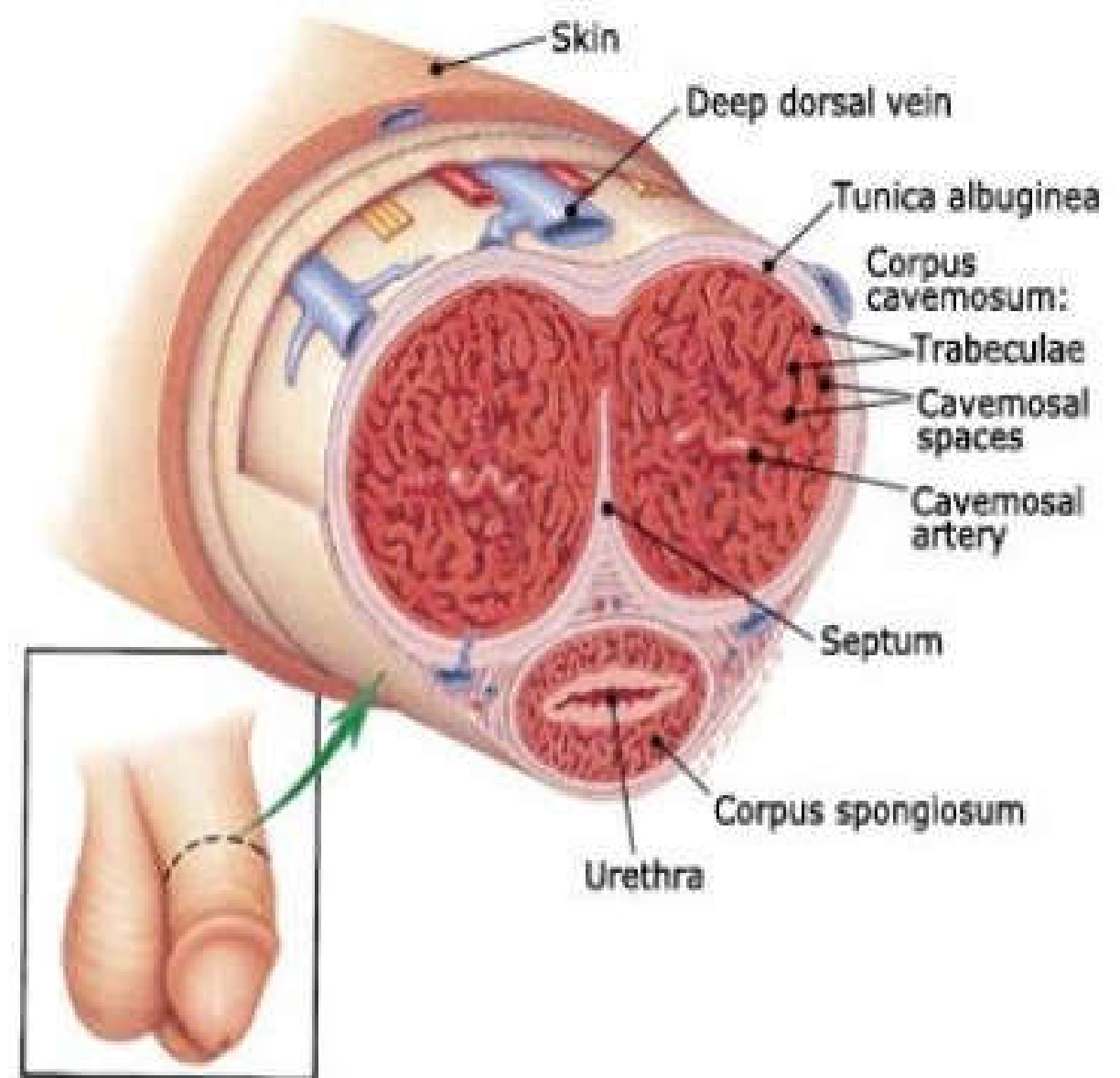
Types of erection

There are three types:

1. Genital stimulated induced by tactile stimulation
2. Central stimulated induced by auditory or visual stimuli
3. Centrally originated cause spontaneous erection without stimulation or during sleep(REM sleep)

Anatomy of the penis

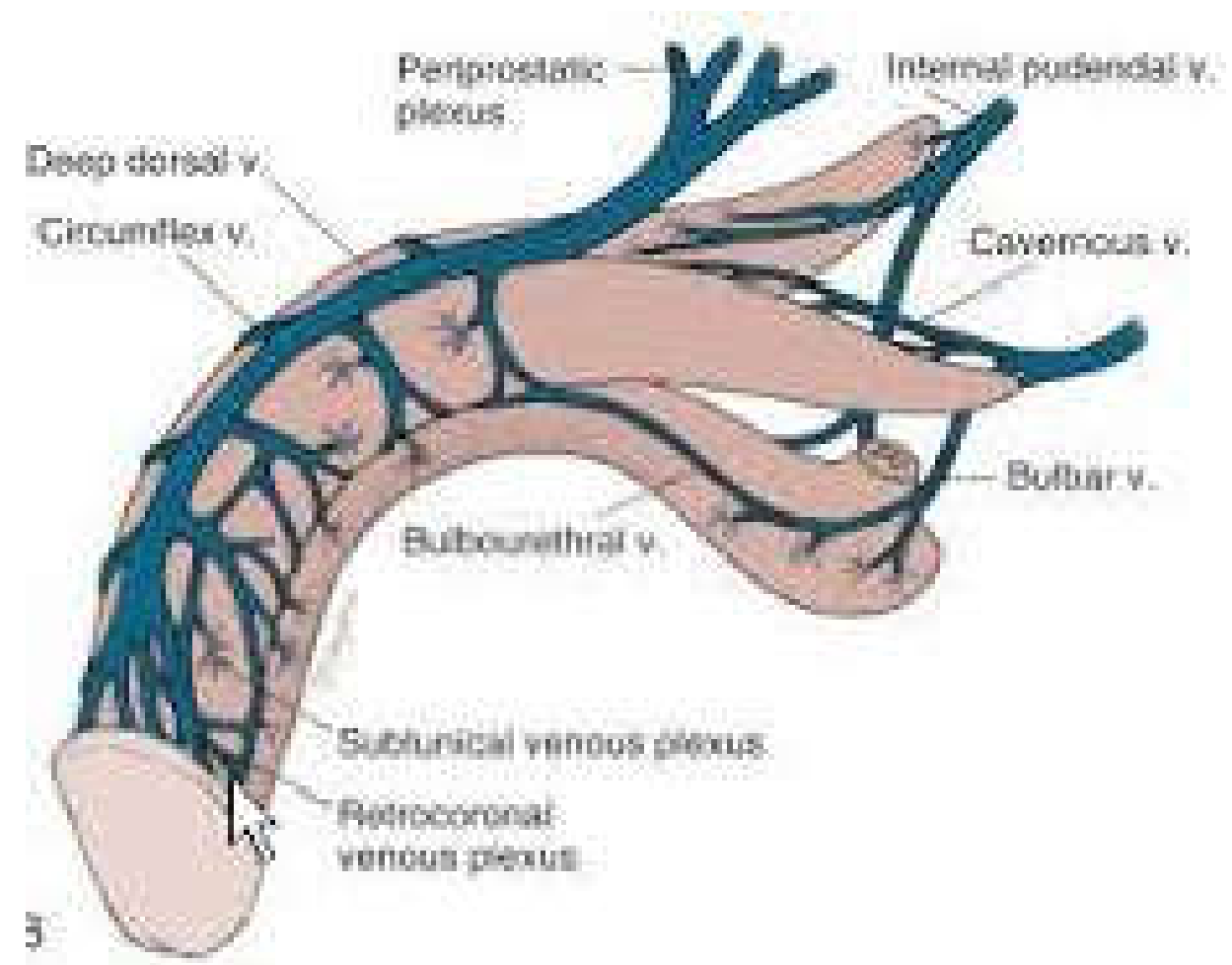
- 2 corpora cavernosa
- corpus spongiosum
- paired internal pudendal artery gives 3 branches (bubourethral artery, dorsal artery and cavernous artery)



Anatomy of the penis

Venous drainage:

- the glans through deep dorsal vein
- corpus spongiosum through circumflex, urethral, bulbar veins)
- corpora cavernosa, distal and mid shaft through deep dorsal vein while proximal through cavernous and crural veins.
- skin and subcutaneous through superficial dorsal veins



Phases of erection process

1. Flaccid phase
2. Filling phase (some elongation of the penis due to increased blood flow in internal pudendal artery)
3. Tumescence phases (more expansion and elongation due to rising intracavernous pressure)
4. Full erection phase
5. Rigid phase
6. Detumescence phase

Hormones and sexual function

- Testosterone regulates gonadotropin secretion and muscle development
- Dihydrotestosterone mediates male sexual maturation
- Androgen deficiency cause ↓libido and E.D

Neurotransmitters & signal in erection

- The principal neurotransmitter for penile erection is NO which is released from parasympathetic nerve ending during sexual stimulation and diffuse into arterial smooth muscles to activate guanyl cyclase to cGMP & cAMP leading to smooth muscle relaxation and erection
- Degradation of cGMP to GMP & cAMP to AMP by phosphodiesterase

Male sexual dysfunction

- Inability to achieve a satisfactory sexual relationship which involve inadequate erection or maintaining erection , ejaculatory disorder and problems in orgasm



Classification and pathogenesis

Inducers	Inhibitors
Papaverine	Phenylephrine
Phentolamine	Epinephrine
Phenoxybenzamine	Norepinephrine
Thymoxamine	Metaraminol
Alprostadil (prostaglandin E1)	Ephedrine
Vasoactive intestinal polypeptide (VIP)	Prostaglandin I ₂
Calcitonin gene-related peptide (CGRP)	Prostaglandin F _{2α}
Nitric oxide donor	Thromboxane A ₂ (TXA ₂)
Guanylate cyclase activator	Endothelin
Dopamine receptor agonist	Angiotensin II
Phosphodiesterase inhibitors	
Rho-kinase inhibitors	
Melanocortin receptors agonist	

I. Psychogenic

.1 Generalized type

- A. Generalized unresponsiveness
 - a. Primary lack of sexual arousability
 - b. Aging-related decline in sexual arousability
- B. Generalized inhibition
 - a. Chronic disorder of sexual intimacy

.2 Situational type

- A. Partner related
 - a. Lack of arousability in specific relationship
 - b. Lack of arousability due to sexual object preference
 - c. High central inhibition due to partner conflict or threat
- B. Performance related
 - a. Associated with other sexual dysfunction/s (eg, rapid ejaculation)
 - b. Situational performance anxiety (eg, fear of failure)
- C. Psychological distress or adjustment related

II. Organic

- .1 Neurogenic
- .2 Hormonal
- .3 Arterial
- .4 Cavernosal (venogenic)
- .5 Drug induced

III. Mixed organic/psychogenic (most common type)

Diagnosis and treatment

1. Medical, sexual and psychosocial history
2. Physical and laboratory investigations
3. IIEF score (erectile function, orgasmic function, sexual desire, intercourse satisfaction and overall satisfaction) 0-7 severe, 8-11 moderate, 12-16 mild to mod, 17-21 mild, no ED 22-25

Tests for penile vascular function

- **ICI test**

injection of alprostadil or papaverine intra-cavernous gives rigidity more than 10 min indicative of normal venous function.

- **Doppler U/S**

used to visualise the dorsal and cavernous arteries also dynamic blood flow analysis

PSV $>30\text{cm/sec}$ & EDV $>5\text{cm/sec}$ means venous leak

RI < 0.75 means venous leakage

can diagnose Peyronie's and fibrosis calcifications

- **Cavernosography**

- **Arteriography**

Treatment options

- Life style changes
- psychosexual therapy
- Hormonal therapy
- Oral pharmacological therapy

Treatment

- Yohimbine is a supplement that has a historical place in the treatment of ED
- Its proposed role in the treatment of ED is to increase parasympathetic and decrease sympathetic activity
- In high enough doses it can lead to diaphoresis, palpitations and elevated heart rate

- The AUA does not recommend yohimbine for the treatment of ED
- Patients with a history suggestive of cardiovascular disease should be cautioned against these supplements

Phosphodiesterase's

- ★ This class of drug is considered first line therapy for those men presenting with ED without a contraindication to their administration
- ★ Administration results in inhibition of PDE throughout the body, but due to the relative importance of the enzyme in the penile tissue, a favorable environment in the penile tissue of prolonged cGMP effect is seen without major change in systemic homeostasis
- ★ This is due to direct inhibition of the breakdown of cGMP produced by the NO/cGMP system

Erectile Dysfunction

ED Treatments

PDE5 inhibitors

- ★ Drugs available include
 - ★ sildenafil citrate (25, 50 and 100 mg ,)
 - ★ vardenafil hydrochloride (5, 10 and 20 mg (
 - ★ and tadalafil (5, 10 and 20 mg for demand dosing, and 2.5 or 5 mg for daily use(
- ★ All are highly specific for PDE5, and all are efficacious in promoting penile erection capability in men with ED

Erectile Dysfunction

ED Treatments

PDE5 inhibitors

Success rates for improvement of erection is ~ 70%-80%, and improvement to the point where the drugs are suitability for monotherapy of ED is seen in ~ 60% of cases

- ★ Choice of agent must take into consideration the sexual pattern of the patient, without the physician making assumptions about such things
- ★ The advent of daily tadalafil presents the option for continuous treatment for ED, equivalent to that of other organic diseases, without suffering a decline in erectile improvement due to the lower dose

ED Treatments

PDE5 inhibitors

- ★ Advantages of PDE5 inhibitors include oral administration, safety and effectiveness
- ★ Disadvantages include cost, systemic administration as opposed to local effect, potential for interaction with nitrates, and poor efficacy in men with severe ED
- ★ Cost is becoming an issue as well, as some insurance companies offer extremely limited coverage for any ED medications

ED Treatments

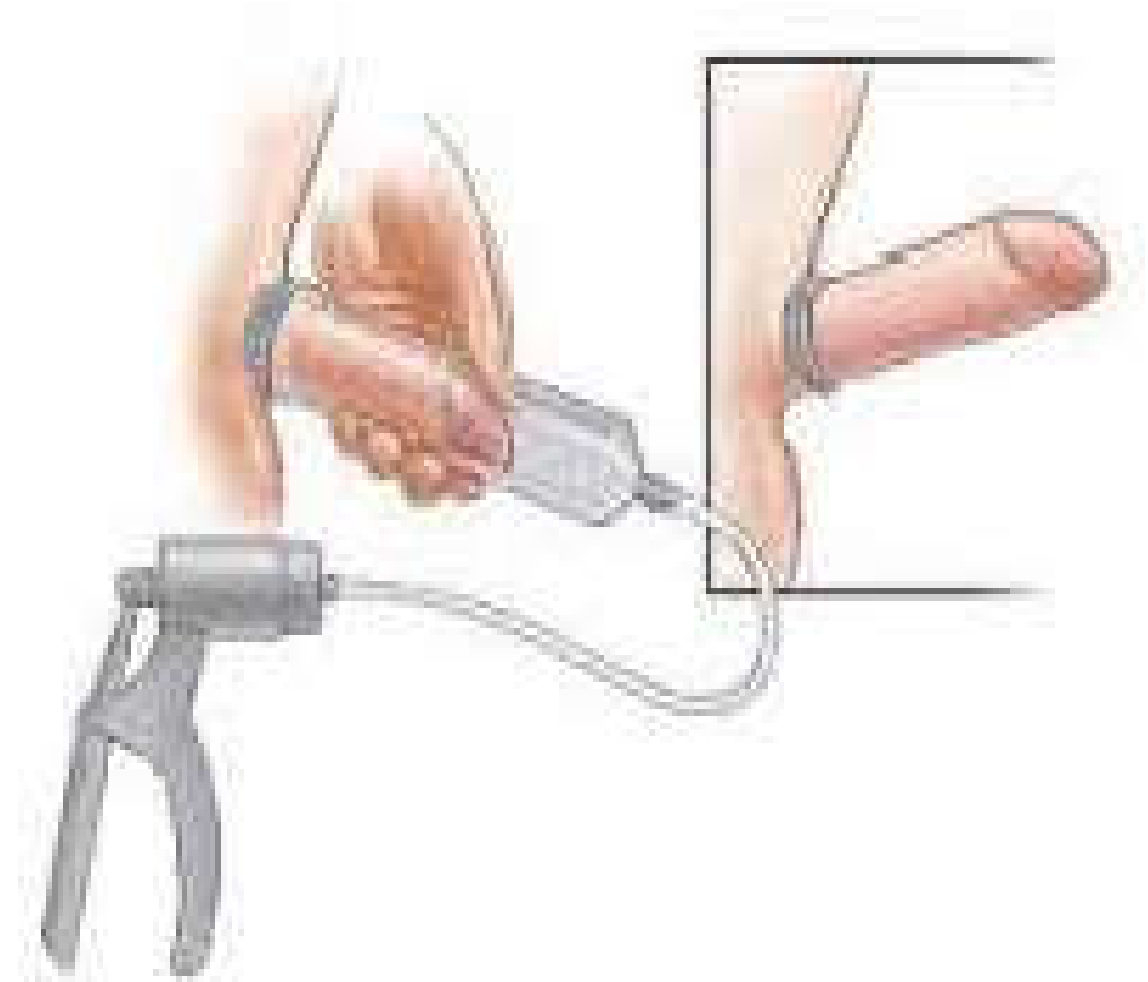
Penile injection therapy

- ★ Many vasoactive agents have been used for ED therapy
- ★ Only alprostadil (PGE1) has been approved by the FDA for this indication
- ★ Alprostadil, when introduced into the corpus cavernosum, activates the cAMP system, leading to calcium flux and smooth muscle relaxation

ED Treatments

Mechanical devices

- ★ **Mechanical devices are similar to semirigids in that they are in a fixed degree of penile girth, so erection quality is a complaint of these devices**



ED Treatments

Mechanical devices

- ★ Malleable penile prosthesis



Erectile Dysfunction

ED Treatments

Mechanical devices

- ★ -2piece inflatable devices were designed To meet the advantages of inflatables, as far as girth expansion and rigidity, while allowing flaccidity and concealment, while also capitalizing on the advantages of semirigid lack of the need for a reservoir implantation
- ★ There is only one 2-piece inflatable available on the market
- ★ It has 2 cylinders which are filled in the center, allowing for fluid insertion just under the surface of the cylinders

Erectile Dysfunction

ED Treatments Mechanical devices

- ★ - 2 piece inflatable penile prosthesis



Erectile Dysfunction

ED Treatments

Mechanical devices

- ★ -3piece inflatable devices are most reported in series in the literature
- ★ They consist of 2 cylinders, a reservoir in the pelvis and a pump in the scrotum
- ★ They are the most complicated devices and require a larger surgical procedure to implant the device
- ★ However, they give the best flaccidity and the best rigidity of all the devices available

Erectile Dysfunction

ED Treatments Mechanical devices

- ★ - 3-piece inflatable penile prosthesis with paired cylinders, reservoir and scrotal pump



Erectile Dysfunction

ED Treatments

Surgical approaches for penile implants

- ★ Complications of penile prosthesis surgery include
- ★ infection, erosion and mechanical failure, necessitating re-operation
- ★ Erosion is thought to be due to subclinical infection in nearly all cases
- ★ With current improvement in coating of prosthetic devices, the infection rate should be $< 1\%$

Erectile Dysfunction

ED Treatments

Surgical approaches for penile implants

- ★ One can never be faulted for removing a device to treat infection
- ★ Fibrosis and shrinkage seen following explantation dictates that one considers a salvage operation in such cases
- ★ If mechanical malfunction is seen in a prosthesis, the entire device should be replaced with a new one

Erectile Dysfunction

ED Treatments

Penile revascularization

- ★ Revascularization of the penis to correct erectile difficulty is uncommonly performed
- ★ due to the stringent criteria for patient selection, including a young age, a history of significant pelvic/perineal trauma, and no preexisting erectile complaints
- ★ Angiography is a prerequisite to the surgery
- ★ Because ED in older men coexists with other comorbidities and involves some degree of venous leak, revascularization is not an option

THANK

YOU

