ERECTILE DYSFUNCTION

Prof. Khan Abul Kalam Azad

Head, Department of Medicine, Dhaka Medical College

President, Bangladesh Society of Medicine

- **Erectile Dysfunction** is defined as the consistent or recurrent inability to acquire or sustain an erection of sufficient rigidity and duration for sexual intercourse.

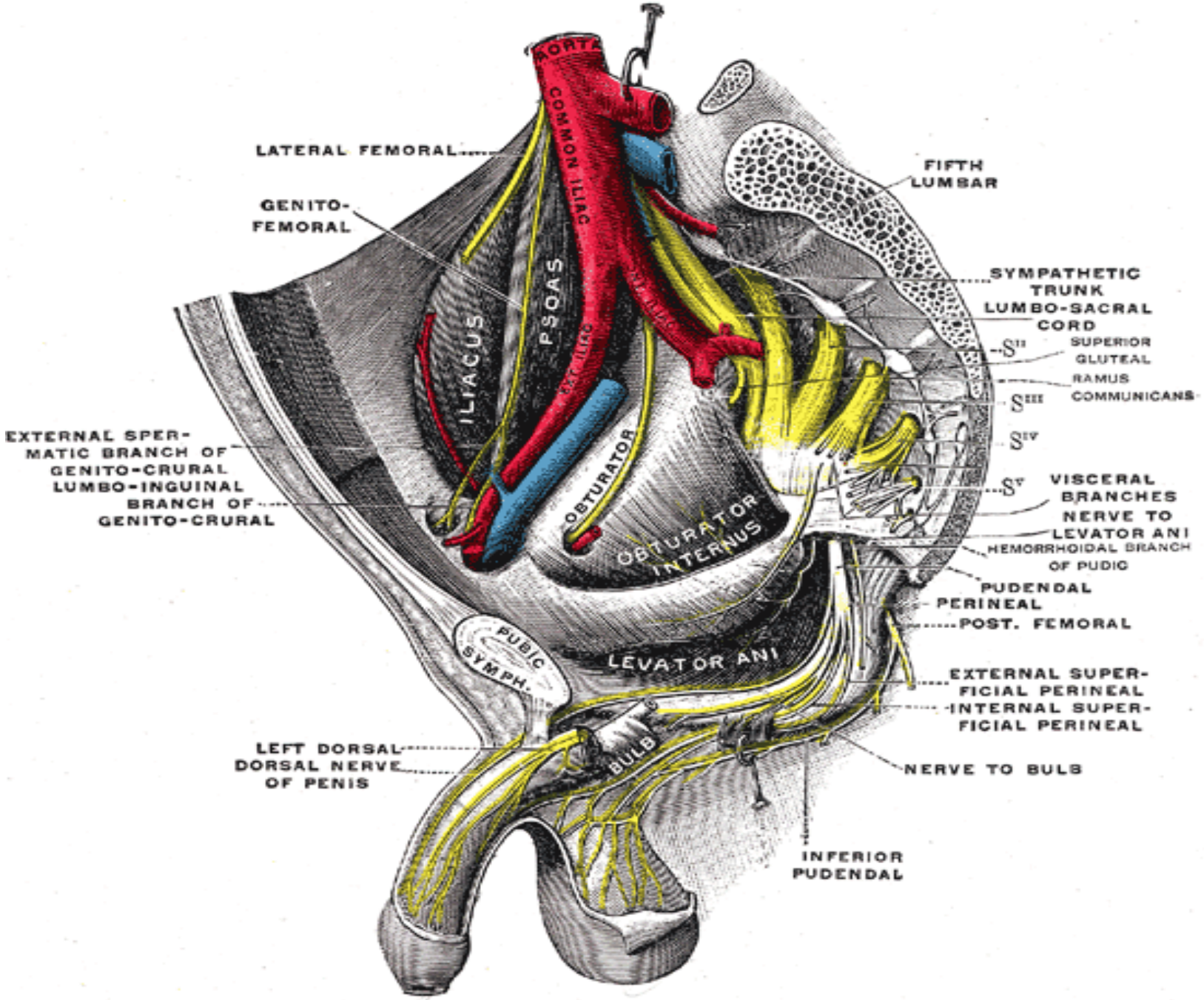
- It is the most common sexual dysfunction in men.

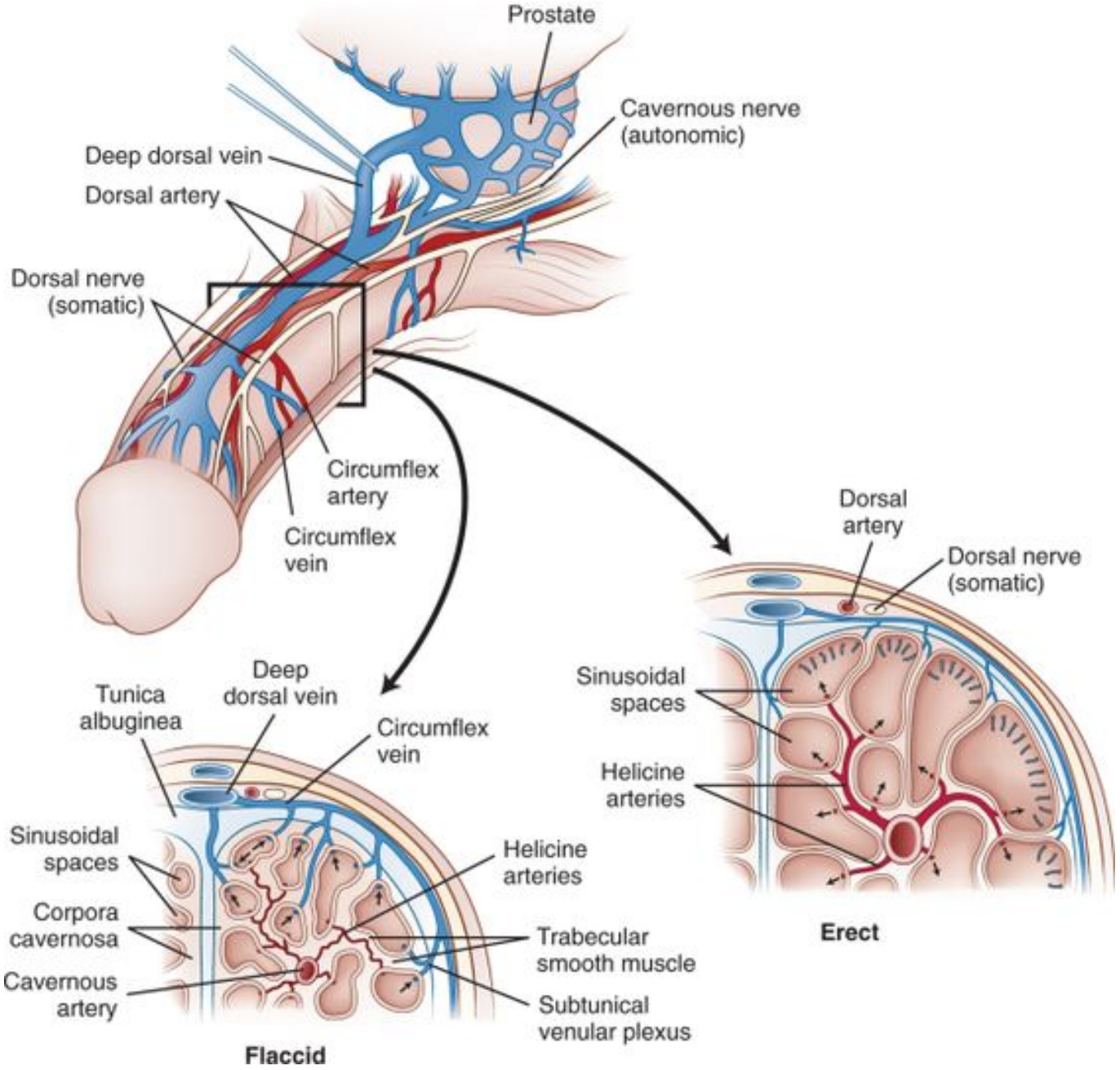
Extent of the problem

Men's Attitudes to Life Events and Sexuality (MALES) Study :

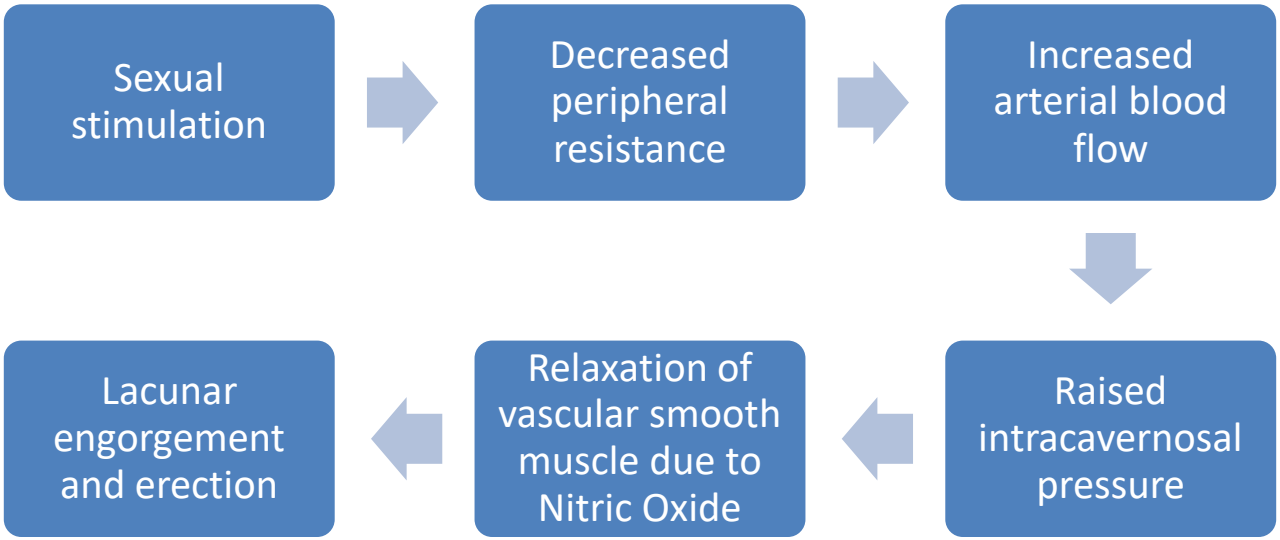
- 27,839 men aged 20-75 years in eight countries were surveyed.
- The overall prevalence of ED was 16 percent.
- Age specific data
  - 8 percent in men 20 to 30 years of age
  - 37 percent in men 70 to 75 years of age.

Rosen RC, Fisher WA, Eardley I, et al. The multinational Men's Attitudes to Life Events and Sexuality (MALES) study: I. Prevalence of erectile dysfunction and related health concerns in the general population. Curr Med Res Opin 2004; 20:607.


LATERAL FEMORAL
GENITO-FEMORAL
EXTERNAL SPERMATIC BRANCH OF GENITO-CRURAL
LUMBO-INGUINAL BRANCH OF GENITO-CRURAL
AORTA
COMMON ILIAC
EXT. ILIAC
ILIACUS
PSOAS
OBTURATOR
OBTURATOR INTERNUS
PUBIC SYMPH.
LEVATOR ANI
BULB
LEFT DORSAL DORSAL NERVE OF PENIS
FIFTH LUMBAR
SYMPATHETIC TRUNK
LUMBO-SACRAL CORD
SI
SUPERIOR GLUTEAL
RAMUS COMMUNICANS
SIII
SIV
SV
VISCERAL BRANCHES
NERVE TO LEVATOR ANI
HEMORRHOIDAL BRANCH OF PUDIC
PUDENDAL
PERINEAL
POST. FEMORAL
EXTERNAL SUPERFICIAL PERINEAL
INTERNAL SUPERFICIAL PERINEAL
NERVE TO BULB
INFERIOR PUDENDAL


Prostate
Cavernous nerve (autonomic)
Deep dorsal vein
Dorsal artery
Dorsal nerve (somatic)
Circumflex artery
Circumflex vein
Dorsal artery
Dorsal nerve (somatic)
Sinusoidal spaces
Helicine arteries
Erect
Tunica albuginea
Deep dorsal vein
Circumflex vein
Sinusoidal spaces
Helicine arteries
Corpora cavernosa
Trabecular smooth muscle
Cavernous artery
Subtunical venular plexus
Flaccid

PHYSIOLOGY OF ERECTION



The whole process uses the peripheral nerves, the lower part of the spinal cord and limbic system of the brain, So an intact neural system is required for a successful and complete erection

ERECTILE DYSFUNCTION: CAUSES

- Organic
  - *Vascular*
  - *Neurogenic*
  - *Endocrine and metabolic*
  - *Drug-related*
- Psychogenic
- Often combination of both.

Cunningham GR, Rosen RC, Overview of male sexual dysfunction. In: UpToDate, Snyder PJ, O'leary MP (Ed), UpToDate, Waltham, MA (Accessed on December 16, 2016)

Vasculogenic	- Cardiovascular disease (hypertension, coronary artery disease, peripheral vasculopathy, etc.) - Diabetes mellitus - Hyperlipidaemia - Smoking - Major pelvic surgery (RP) or radiotherapy (pelvis or retroperitoneum)
Neurogenic	**Central causes** - Degenerative disorders (multiple sclerosis, Parkinson's disease, multiple atrophy, etc.) - Spinal cord trauma or diseases - Stroke - Central nervous system tumours **Peripheral causes** - Type 1 and 2 diabetes mellitus - Chronic renal failure - Polyneuropathy - Surgery (major surgery of pelvis/retroperitoneum, RP, colorectal surgery, etc.) - Surgery of the urethra (urethral stricture urethroplasty, etc)

Anatomical or structural	- Hypospadias, epispedias - Micropenis - Peyronie's disease
Hormonal	- Hypogonadism - Hyperprolactinemia - Hyper- and hypothyroidism - Hyper- and hypocortisolism (Cushing's disease, etc.) - Panhypopituitarism and multiple endocrine disorders
Drug-induced	- Antihypertensives (thiazide diuretics, etc.) - Antidepressants (selective serotonin reuptake inhibitors, tricyclics) - Antipsychotics (neuroleptics, etc.) - Antiandrogens (GnRH analogues and antagonists) - Recreational drugs (alcohol, heroin, cocaine, marijuana, methadone, synthetic drugs, anabolic steroids, etc.)
Psychogenic	- Generalised type (e.g., lack of arousability and disorders of sexual intimacy) - Situational type (e.g., partner-related, performance-related issues or due to distress)
Trauma	- Penile fracture - Pelvic fracture

K. Hatzimouratidis, I. Eardley, F. Giuliano, et al. Guidelines on Male Sexual Dysfunction: Erectile Dysfunction and Premature Ejaculation. The Netherlands: European Association of Urology; 2015. http://uroweb.org/guideline/male-sexual-dysfunction/.

ED PRESENTATION

For all these causes Erectile dysfunction symptoms might present as…

- Trouble getting an erection
- Trouble keeping an erection
- Reduced sexual desire

EVALUATION

History

- Sexual History:
  - International Index of Erectile function(IIEF) – 5
- Rapidity of onset
- Evaluation of erectile reserve :
  - 'Nocturnal penile tumescence‘
- Assessment of interpersonal conflict and partner interview
- Assessment of risk factors and causes

Cunningham GR, Khera M. Evaluation of male sexual dysfunction. In: UpToDate, Snyder PJ, Masumoto AM, O’leary MP (Ed), UpToDate; Waltham, MA (Accessed on December 16, 2016)

EVALUATION

International Index of Erectile Function - 5

Over the past six months:

1	How do you rate your **confidence** that you could get and keep an erection?	Very low	Low	Moderate	High	Very high
		1	2	3	4	5
2	When you had erections with sexual stimulation, how often were your erections hard enough for penetration?	Almost never/never	A few times (much less than half the time)	Sometimes (about half the time)	Most times (much more than half the time)	Almost always/always
		1	2	3	4	5
3	During sexual intercourse, **how often** were you able to maintain your erection after you had penetrated (entered) your partner?	Almost never/never	A few times (much less than half the time)	Sometimes (about half the time)	Most time (much more than half the time)	Almost always/always
		1	2	3	4	5
4	During sexual intercourse, **how difficult** was it to maintain your erection to completion of intercourse?	Extremely difficult	Very difficult	Difficult	Slightly difficult	Not difficult
		1	2	3	4	5
5	When you attempted sexual intercourse, how often was it satisfactory for you?	Almost never/never	A few times (much less than half the time)	Sometimes (about half the time)	Most times (much more than half the time)	Almost always/always
		1	2	3	4	5

Severe (5-7)	Moderate (8-11)	Mild to moderate (12-16)	Mild (17-21)	No ED (22-25)

Rosen RC, Cappelleri JC, Smith MD, et al. Development and evaluation of an abridged, 5-item version of the International Index of Erectile Function (IIEF-5) as a diagnostic tool for erectile dysfunction. Int J Impot Res 1999; 11:319.

EVALUATION

Clinical clues to causes of erectile dysfunction

Finding	Cause
Rapid onset	Psychogenic Genitourinary trauma - e.g., radical prostatectomy
Non-sustained erection	Anxiety Venous leak
Depression or use of certain drugs	Depression Drug-induced
Complete loss of nocturnal erections	Vascular disease Neurologic disease

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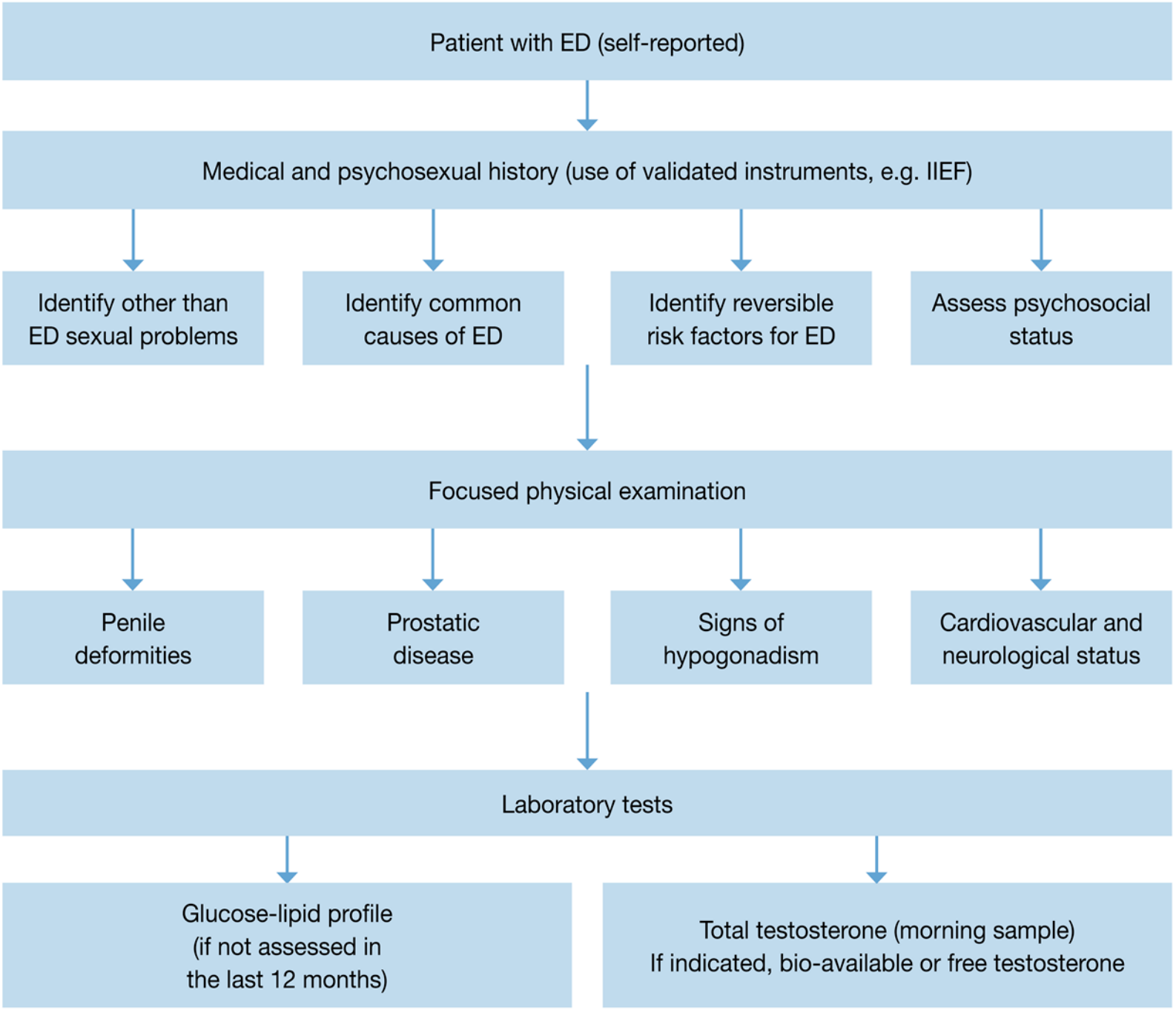
EVALUATION

Physical examination

- Assessment of femoral and peripheral pulses – Vascular ED.
- Search for penile plaques – Peyronie's disease
- Exam of patient for lack or loss of normal male hair patterns, gynaecomastia and small testes.
- Evaluation of cremasteric reflex – Integrity of thoracolumbar erection center.
- Search for visual field defect in hypogonadal male with pituitary tumour.

Basic work up algorithm for ED



ED = erectile dysfunction; IIEF = International Index of Erectile Function.

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EVALUATION

Laboratory studies and diagnostic tests :

To determine underlying cause and risk factors.

- Complete blood count.
- Fasting glucose or glycated hemoglobin.
- Liver and kidney function tests.
- Thyroid function test.
- Fasting Lipid profile.
- Serum total testosteron level.
- Serum prolactine level if indicated.

EVALUATION

Specific diagnostic tests:

- Nocturnal penile tumescence and rigidity test using Rigiscan
- Vascular studies
  - Intracavernous vasoactive drug injection
  - Penile Dynamic Duplex Doppler study
  - Penile Dynamic Infusion Cavernosometry and Cavernosography
  - Internal pudendal arteriography
- Neurological studies (e.g., bulbocavernosus reflex latency, nerve conduction studies)
- Endocrinological studies
- Specialised psychodiagnostic evaluation

EVALUATION

Indications for specific diagnostic tests
Primary ED (not caused by organic disease or psychogenic disorder).
Young patients with a history of pelvic or perineal trauma, who could benefit from potentially curative vascular surgery.
Patients with penile deformities which might require surgical correction (e.g., Peyronie's disease, congenital curvature).
Patients with complex psychiatric or psychosexual disorders.
Patients with complex endocrine disorders.
Specific tests may be indicated at the request of the patient or his partner.
Medico-legal reasons (e.g., implantation of penile prosthesis, sexual abuse).

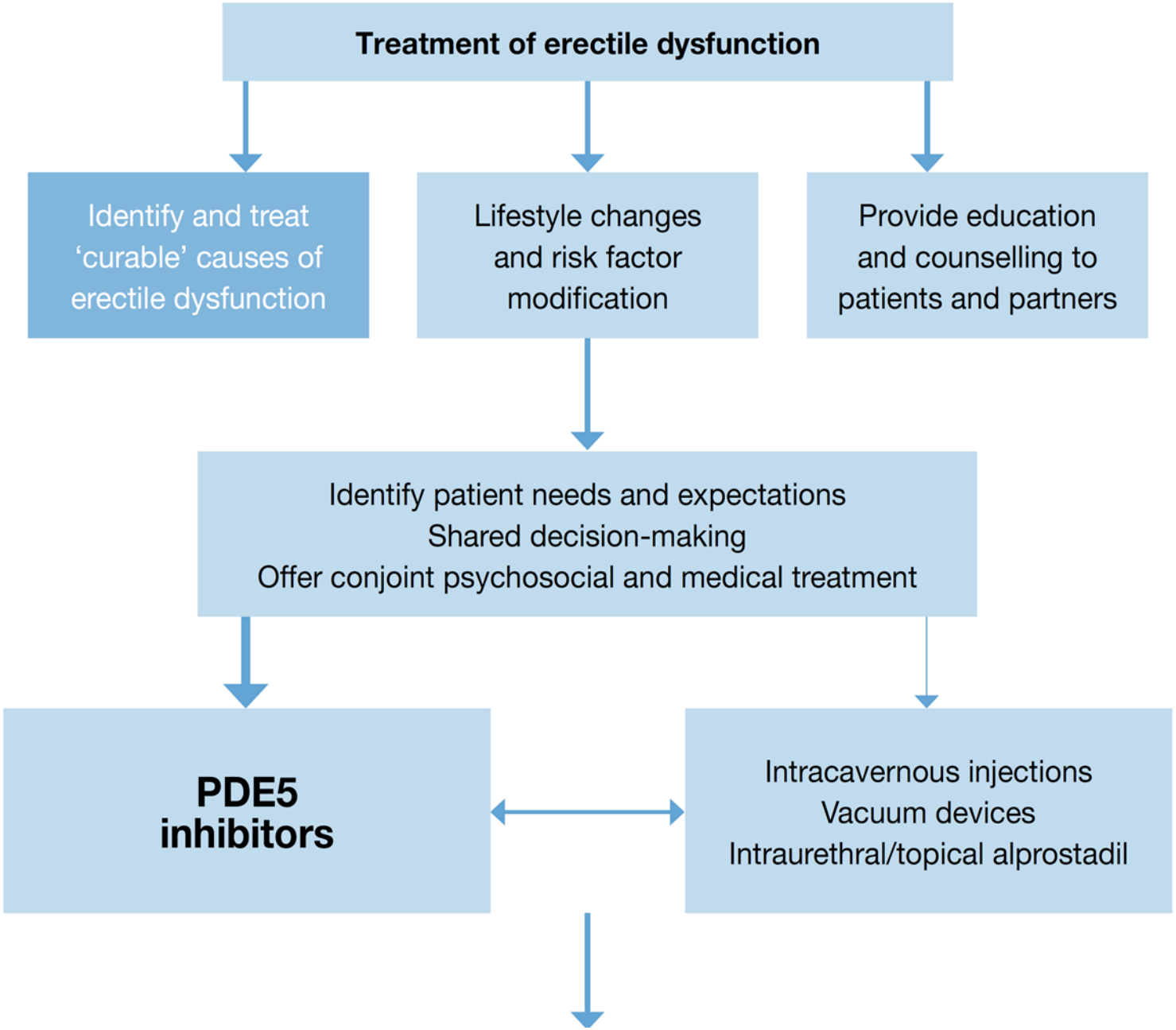
ERECTILE DYSFUNCTION- TREATMENT

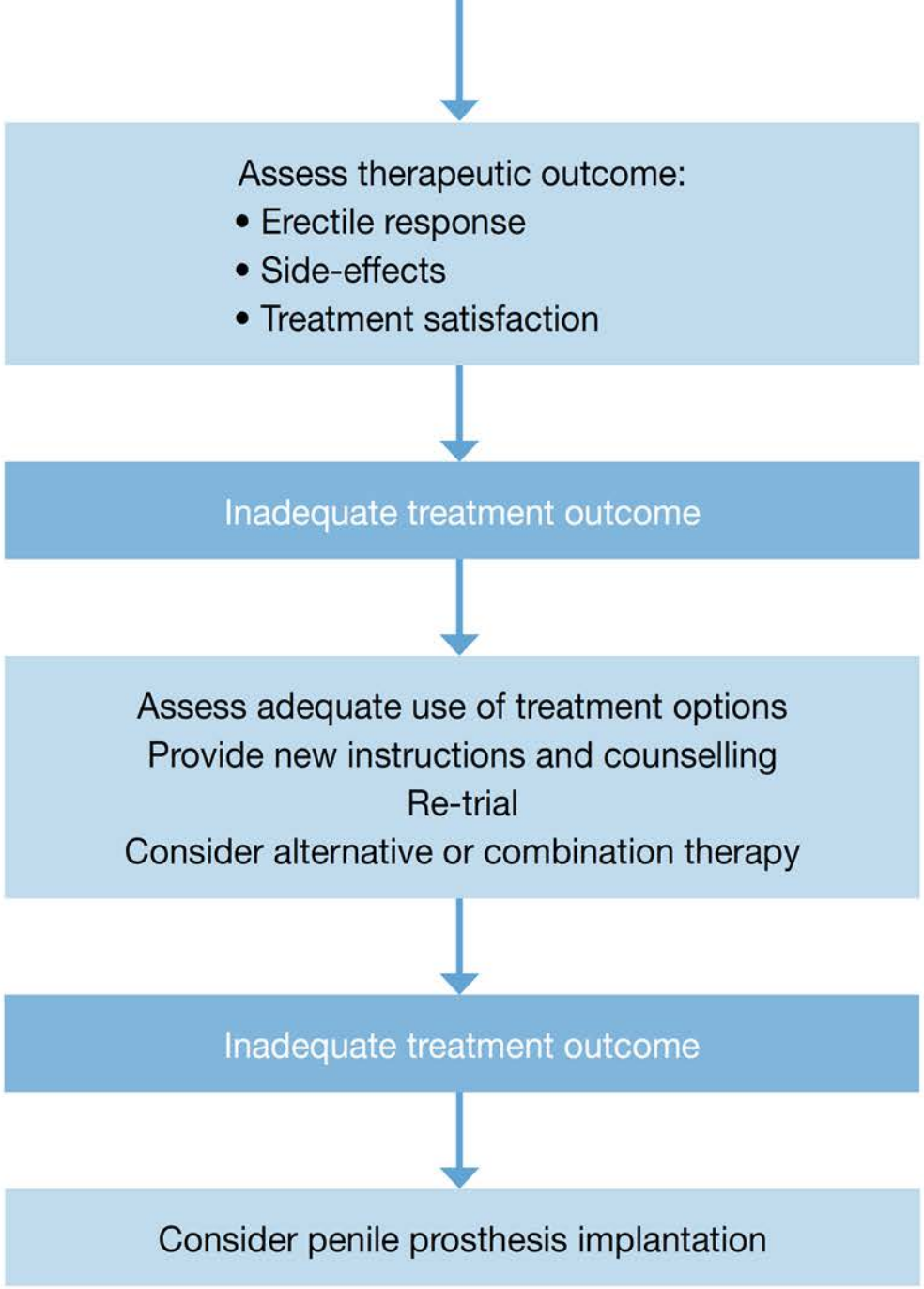
Therapy for Erectile dysfunction is aimed at:

- Improving libido
- Addressing the capacity to acquire and sustain penile erection

Approach:

- If Erectile dysfunction is **drug induced,** before starting any therapy the causative agent should be replaced with alternative second medication.
- Testosterone replacement in hypogonadism patient.


Treatment of erectile dysfunction
Identify and treat 'curable' causes of erectile dysfunction
Lifestyle changes and risk factor modification
Provide education and counselling to patients and partners
Identify patient needs and expectations
Shared decision-making
Offer conjoint psychosocial and medical treatment
PDE5 inhibitors
Intracavernous injections
Vacuum devices
Intraurethral/topical alprostadil


Assess therapeutic outcome:
• Erectile response
• Side-effects
• Treatment satisfaction
Inadequate treatment outcome
Assess adequate use of treatment options
Provide new instructions and counselling
Re-trial
Consider alternative or combination therapy
Inadequate treatment outcome
Consider penile prosthesis implantation

MANAGEMENT

- Lifestyle changes
  - Weight loss
  - Physical activity and Exercise
    - Aerobic exercise of moderate to vigorous intensity
    - Pelvic floor exercise
  - Cessation of smoking

- Cunningham GR, Khera M, Treatment of male sexual dysfunction. In: UpToDate, Snyder PJ, O'leary MP (Ed), UpToDate, Waltham, MA (Accessed on December 16, 2016)
- Silva AB, Sousa N, Azevedo LF*, et al* Physical activity and exercise for erectile dysfunction: systematic review and meta-analysis *Br J Sports Med* Published Online First: 05 October 2016. doi: 10.1136/bjsports-2016-096418*

ED TREATMENT OPTIONS

- First line therapy
  - Oral pharmacotherapy
  - Vacuum erection devices
  - Shockwave therapy
- Second line therapy
- Surgery

Oral pharmacotherapy

Phosphodiesterase-5 Inhibitors :

1st line oral medication-

- For their efficacy,
- Ease of use
- Favorable side effect profile.

- Sildenafil, Verdenafil, Tadalafil and the newest agent Avanafil all are equally effective.
- Tadalafil has a longer duration of action
- Avanafil has a more rapid onset.

Oral pharmacotherapy

Parameter	Sildenafil, 100 mg	Tadalafil, 20 mg	Vardenafil, 20 mg	Avanafil 200mg
C_{max}	560 µg/L	378 µg/L	18.7 µg/L	5.2 µg/L
T_{max} (median)	0.8-1 h	2 h	0.9 h	0.5-0.75 h
T1/2	2.6-3.7 h	17.5 h	3.9 h	6 – 17 h
AUC	1685 µg.h/L	8066 µg.h/L	56.8 µg.h/L	11.6 µg.h/L
Protein binding	96%	94%	94%	99%
Bioavailability	41%	NA	15%	8-10%

C_{max}: maximal concentration, T_{max}: time-to-maximum plasma concentration; T1/2: plasma elimination halftime; AUC: area under curve or serum concentration time curve.

Adverse event	Sildenafil	Tadalafil	Vardenafil	Avanafil 200mg
Headache	12.8%	14.5%	16%	9.3%
Flushing	10.4%	4.1%	12%	3.7%
Dyspepsia	4.6%	12.3%	4%	uncommon
Nasal congestion	1.1%	4.3%	10%	1.9%
Dizziness	1.2%	2.3%	2%	0.6%
Abnormal vision	1.9%		< 2%	none
Back pain		6.5%		< 2%
Myalgia		5.7%		< 2%

Safety issues with PDE5Is

- All PDE5Is are contraindicated in patients:
  - who have suffered from a myocardial infarction, stroke, or life-threatening arrhythmia within the last 6 months;
  - with
    - Resting hypotension
    - Unstable angina,
    - Angina with sexual intercourse,
    - Heart failure

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Drug interactions

- Nitrates are contraindicated with PDE5 inhibitors
- Co-administration of PDE5Is with antihypertensive agents (ACEIs, ARBs, CCB, β-blockers, and diuretics) may result in small additive decreases in blood pressure.
- All PDE5Is show some interaction with α-blockers, which under some conditions may result in orthostatic hypotension.

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ERECTILE DYSFUNCTION- TREATMENT Cont…

Vacuum erection devices

- VEDs provide passive engorgemer of the corpora cavernosa, togethe with a constrictor ring placed at th base of the penis to retain blood within the corpora.

- The commonest adverse events include pain, inability to ejaculate, petechiae, bruising, and numbnes

- Chosen in older patients with infrequent sexual intercourse and comorbidity requiring non-invasiv drug-free management of ED.

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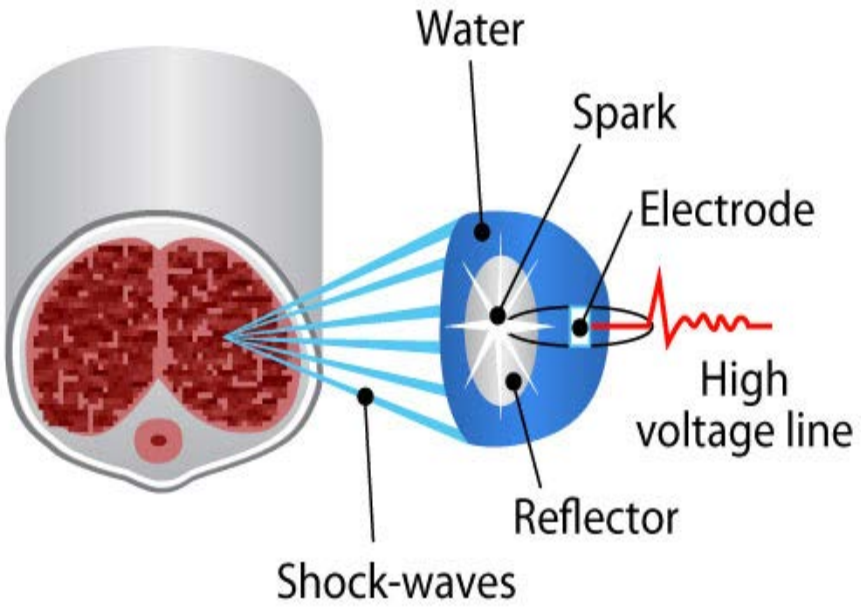
ERECTILE DYSFUNCTION- TREATMENT Cont…

Shockwave therapy (low-intensity extracorporeal shock wave therapy (LI-SWT)

- LI-SWT has a positive short-term clinical and physiological effect on the EF of men
- Improvement in penile haemodynamics and endothelial function
- Imrovement in IIEF-EF domain score in severe ED patients who are poor responders to PDE5Is.



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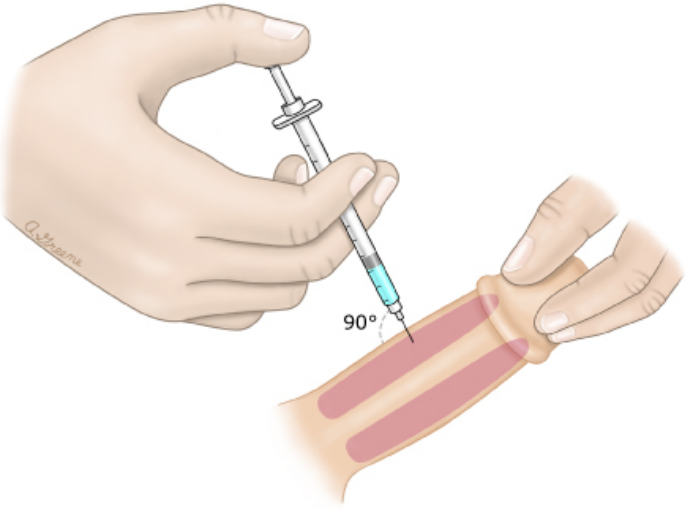
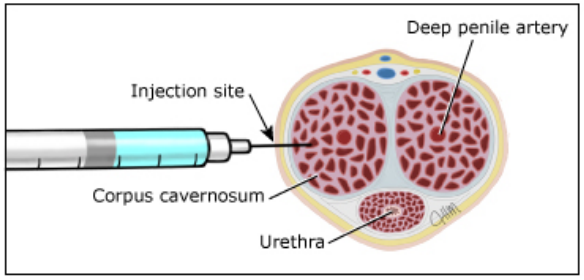
ERECTILE DYSFUNCTION- TREATMENT Cont…

Second-line therapy

- Intracavernous injections:
  - Alprostadil
  - Combination of Vasoactive intestinal peptide (VIP) and phentolamine
- Intraurethral pellet
  - Alprostadil
- Topical alprostadil





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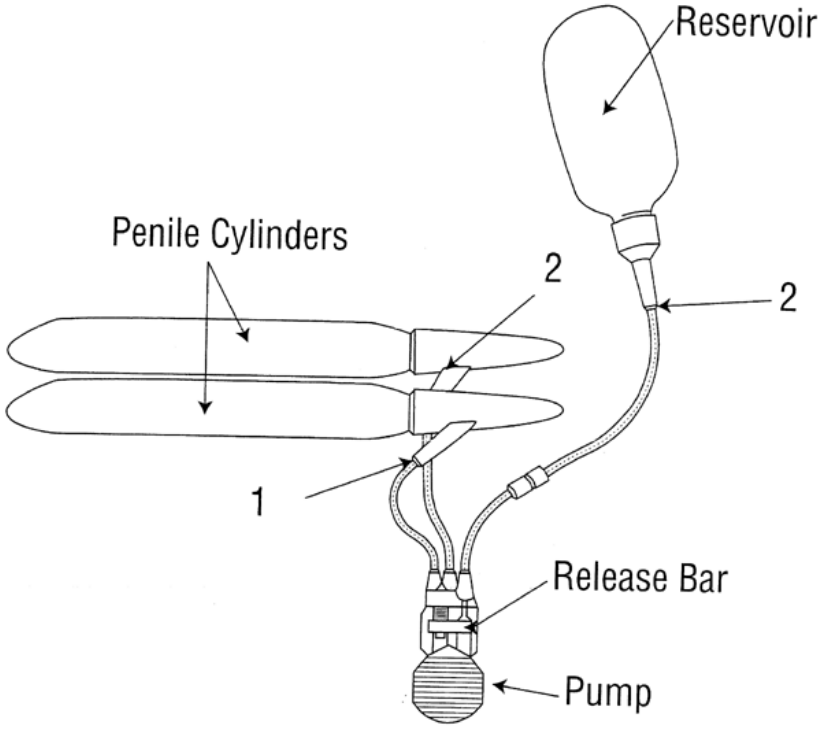
ERECTILE DYSFUNCTION- TREATMENT Cont…

Surgical Options

- Implantation of penile prosthesis
- Penile revascularization surgery



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ERECTILE DYSFUNCTION- TREATMENT Cont…

Others :

- Psychotherapy alone or in combination with psychoactive drugs.

- Treatment of underlying cause :

  Diabetes Mellitus.

  Cardiovascular disease.

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CONCLUSION

- Erectile dysfunction is a silent killer for male.
- It distorts the personal life, the conjugal life and decreases the overall performance of a man.
- Recognition of any form of ED is essential for a man and immediate consultation is beneficial.

THANK YOU

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