ERECTILE DYSFUNCTION/IMPOTENCE (ED)
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DESCRIPTION

Concurrent or recurrent inability to attain and/or maintain an erection sufficient for satisfactory sexual activity

Synonym(s): Impotence

EPIDEMIOLOGY

Incidence

Increases with each decade above 40 (1,3):- 12 cases per 1,000 men-ys 40–49 yr- 30 cases per 1,000 men-ys 50–59 yr- 46 cases per 1,000 men-ys 60–69 yr

Prevalence

Increases universally with age and medical comorbidities (DM, cardiovascular disease):- Up to 40% of men at age 40 have some degree of ED.- Up to 75% of men >70 have some degree of ED.

RISK FACTORS

Probable of ED increases with each risk factor (1,3):- DM: – 30–75% of all men w/diabetes have some degree of erectile dysfunction.- Cardiovascular disease (hypertension, hyperlipidemia, peripheral vascular disease):- Chronic renal failure, chronic liver disease
- Endocrine (hypogonadism, Cushing disease)
- Prior abdominal/pelvic/penile surgery, radiation, or trauma
- Prostatic, Peyronie disease
- Long-distance cycling
- Depression, other CNS pathology
- Medications:
  – Antihypertensives (thiazide diuretics, β-adrenergic blockers, and α-adrenergic agonists): β-blockers, α-blockers
  – ACE inhibitors and α-adrenergic blockers: cause less ED.
  – Psychostimulants (SSRI, lithium, MAOIs)
  – Antidepressants, other (bupropion, trazodone, mirtazapine, drugin) marijuana
- Smoking

GENERAL PREVENTION

Avoid smoking
- Sph bike seat for long distance riding

PATHOPHYSIOLOGY

Mechanism of erection (1,3,4):
- Relaxation of cavernosal artery smooth muscle (smooth muscle is contracted in flaccid state, limiting penile blood flow):
  – Mediated by release of NO from pelvic nerves, causing
  – Increase in cyclic GMP (cGMP), causing
decrease in smooth muscle intracellular calcium, causing
smooth muscle relaxation, increased penile blood flow, and tumescence.
  – cGMP is degraded primarily by phosphodiesterase type 5 (PDE5), restricting venous outflow from penis
- Organic ED:
  – Vascularogenic (arteriogenic via atherosclerotic changes, traumatic injury to arteries; failure of corporal vasodilatation)
  – Neurogenic (Alzheimer disease, Parkinson disease, injury to CNS, spinal cord, or peripheral nerves)
  – Endocrinic
  – Endocrinologic (hyperprolactinemia decreased testosterone, hyper or hypothyroidism, adrenal disorders/Cushing syndrome)
- Psychogenic ED:
  – Only 10% of men
  – More common in men <45
  – May result from lack of interest in partner, performance-related anxiety, negative mood, major life stress

COMMONLY ASSOCIATED CONDITIONS

- Anatomic
  – Priapism
- Neurologic
  – Stroke

DIAGNOSIS

HISTORY

- Medical history
- Surgical history
- Psychosocial History (status of current relationship, level of libido, duration of ED, onset of ED (gradual or sudden), presence of nocturnal erections, presence of penile curvancy, quality of erections)
  – International Index of Erectile Function Questionnaire 5:
    – 5 questions each ranging from 0–5 (total 25 points), higher scores with better function
  – Classifies ED into severe (8–11), moderate (6–7), moderate (4–5), mild (2–3), mild (1–2), mild no ED (22–25)
- Medication history
- Social history
- Alcohol, smoking, recreational drugs, cycling history

PHYSICAL EXAM

- Neurologic: Stroke, CNS disease, visual field defects, peripheral neuropathy, penile sensation
- Endocrinologic: Loss of secondary sexual characteristics, atrophic testes, gynecomastia
- Ablation: AAA, cirrhosis
- Cardiovascular: BP, femoral and pedal pulses, evidence of lower extremity ischemia
- Penile: Peyronie disease plaques
- Rectal exam

DIAGNOSTIC TESTS & INTERPRETATION

- Lab: CBC
  – Random glucose level, hemoglobin A1C
  – lipid profile
  – Early-morning serum testosterone
  – PSA
  – Urinalysis
  – TSH
  – UA
  – Testosterone
- Diagnostic Procedures/Surgery
  – Before any invasive test, a trial of oral pharmacotherapy is warranted (4,6,7)
  – Specialized testing indicated:
    – In young men <40
    – In men with no risk factors
    – In men with previous pelvic/abdominal trauma
  – When it will direct therapy
  – CO2 with duplex US
    – CIS: Intracavernous injection of vasodilator and gynalabidinal sexual stimulation with measurement of erection
    – With US, allows objective evaluation of vascular status of penis
    – Nocturnal penile tumescence (RigiScan):— Automated, portable measurement of nocturnal erection
    – Presence of full erection proves intact neurovascular axis; diagnoses psychogenic ED
  – Tests no longer used: PBE, Penile phallography

Pathological Findings

Based on primary disease process

TREATMENT

- Patient and partner should be informed of all relevant treatment options and associated risks/benefits, and treatment choice should be made among physician, patient, and partner (5,8)
  – Cardiovascular risk assessment (done before proceeding with any therapy):
    – Low risk: Asymptomatic, <3 risk factors; may proceed with treatment
    – Intermediate risk: Asymptomatic, 3–5 risk factors, stable angina, mild heart failure; full cardiovascular assessment to re-classify as low or high risk
    – High risk: Unstable angina, recent MI, uncontrolled HTN, advanced heart failure or valvular disease, failure until cardiac condition stabilized
    – Due to the availability of PDE5 inhibitors, often empiric therapy is used.
MEDICATION
First Line
PDE5 inhibitors (3,4)
- Mechanism: Inhibit breakdown of corporal cGMP, thus promote smooth muscle relaxation
- Drugs:
  - Sildenafil (Viagra): Onset 15–60 min duration of action 4–6 hr
  - vardena (Levitra): Onset 15–60 min, duration of action 2–8 hr
  - Tadalafil (Cialis): Onset 15–120 min, duration of action <24–36 hr
- Contraindications to PDE5 inhibitor:
  - Absolute: Use of nitrites, use of α-adrenergic antagonist (tadalafil only), priapism risk (sildenafil)
  - Relative: Should be postponed for 4 hr after taking α-adrenergic antagonist
- Variability:
  - Should not be taken with type 1A or type 3 antiarrhythmics or in patients with long QT syndrome
- Side effects:
  - All: Headache, dyspepsia, facial flushing
  - Sildenafil: Blurred/Blue vision
  - Tadalafil: Backache, myalgia
  - Vardenafil: Should not be taken with type 1A or type 3 antiarrhythmics or in patients with long QT syndrome
  - Drugs: Alprostadil (PGE1, Caverject), papaverine, phentolamine, or Trimix (all 3 drugs)
- Mechanism: Self-injection of vasoactive agent into corpora cavernosa; produces rapid erection
- Efficacy: Well over 50% of patients with organic ED respond; effective even in diabetic and postprostatectomy patients
- Second Line
  - Intracavernous injection therapy:
    - Mechanism: Self-injection of vasoactive agent into corpora cavernosa, produces rapid erection
    - Drugs: Alprostadil (PGE1), Carbopreps, papaverine, phentolamine, or Trimix (all 3 drugs)
    - Contraindications: Concomitant monamine oxidase medications, decreased dexterity
    - Side effects: Fibrosis, priapism, painful erection, hemodystasia
    - Efficacy: 80–90% effective in wide range of patients (2,3)
- Intrarethral injection therapy:
  - MUSE (Medicated Urethral System for Erection)
  - Insertion of alprostadil (PGE1)–containing pellet in distal urethra, absorption into corpora cavernosa; erection in 30 min
  - Contraindications: Priapism risk
  - Side effects: Perineal pain, dysuria, vaginal pain
  - Efficacy: <50% effective (4,5)
- Vacuum constriction device:
  - Good 2nd line nonpharmacologic alternative or adjunct to pharmacotherapy
  - Should be pursued prior to PPI
  - Device used to produce negative penile pressure, thus engorging penis
  - Constricting ring at base of penis maintains tumescence
  - Side effects: Penile ischemia (>30 min of use), pain

SURGERY/OTHER PROCEDURES
- PPI:
  - Indications: Failed 1st- and 2nd-line pharmacotherapy or 2nd-line vacuum-erection device
  - Definitive treatment of ED, with placement of inflatable cylinders into corpora cavernosa
  - Complications: Infarction (<1%), erosion (<5%), mechanical malfunction (<10%)
  - Penile revascularization
    - Indications: Reversed for select young patients with clearly documented arterial occlusion

ADDITIONAL TREATMENT
- Psychosocial therapy:
  - Patients with psychogenic ED should be referred for sex therapy
  - Cognitive-behavioral intervention used to identify sexual stressor and refocus maladaptive thought process
- Yohimbine:
  - α–adrenergic agonist; centrally acting
  - No evidence that drug augments erections in organic ED
  - May have role in psychogenic ED

ALERT
Herbal and dietary supplements used to treat ED are not FDA-approved; those listed here are for reference only

COMPLEMENTARY AND ALTERNATIVE MEDICINE
Therapies reported to possibly improve ED are ginkgo biloba, red ginseng, yohimbine

ONGOING CARE
FOLLOW-UP RECOMMENDATIONS
Patient Monitoring
Patients should be re-evaluated on frequent basis, following considerations:
- Response to initial therapy
- Need for dose titration
- Need for patient education (taking PDE5 inhibitor on empty stomach at appropriate time point, proper administration at local therapy)
- Progression to 2nd-line therapy or surgery based on response to dose titration, therapeutic effectiveness, patient satisfaction
- Consider using sexual, validated questionnaires to evaluate effectiveness

REFERENCES

ADDITIONAL READING
See Also (Topic, Algorithm, Electronic Media Element)
Erectile Dysfunction, Following Pelvic Surgery or Radiation

CODES
ICD9
521.5 Sexual dysfunction with inhibited sexual excitement
521.6 Impotence of organic origin

ABBREVIATIONS
- AAA: Abdominal aortic aneurysm
- ACE: Angiotensin-converting enzyme
- BP: Blood pressure
- CBC: Complete blood count
- CNS: Central nervous system
- ED: Erectile dysfunction
- IP: Inflatable penile prosthesis
- LH: Leuteinizing hormone
- MAOI: Monoamine oxidase inhibitor
- PSA: Prostate-stimulating antigen
- SIR: Selective serotonin reuptake inhibitor
- TSH: Thyroid-stimulating hormone
- US: Ultrasound

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