

# Physical Therapy Treatment of Erectile Dysfunction

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## Male Pelvic Floor Muscles

- Levator ani (LA) - all muscles play a role in orgasm, urinary and for rectal continence
- Striated urethra sphincter (SUS) - most responsible for urinary continence
- Superficial perineal muscles - continence and sexual function
  - Ischiocavernosus muscle: over the corpus cavernosus base (crus of the penis), assists with erection by compressing the venous return from the penis
  - Bulbospongiosus muscle (BC): over the proximal corpus spongiosum (bulb of the penis) medial and ventral penis; empties the bulb of the penis of residual urine and/or semen (squeeze out), assist with erection

## Normal male sexual function

- Libido - desire
- Penile erection - arousal
- Ejaculation - emission of semen
- Orgasm - rhythmic contractions of the pelvic floor muscles (pleasure) can occur without an erection or an ejaculation

## Mechanics of an erection

- Arousal = relax of smooth muscles around the corpus spongiosum and corpus cavernosum = blood flow into spongy tissue = penile hardening
- Penile veins constrict = keep the penis engorged and rigid
- Superficial pelvic floor muscles (ischiocavernosus, bulbospongiosus) at the base of the penis trap the blood in the spongy tissue = increasing rigidity and sustaining the erection
- Superficial pelvic floor muscles also aid in emission of ejaculation

## Sleep related erections

- Normally occur
- Related to REM sleep
- Decrease in intensity and frequency as men age

Erectile dysfunction (International Continence Society) - the complaint of inability to achieve and sustain an erection firm enough for satisfactory sexual performance. (D'Ancona 2019)

- Need for more physical stimulation to start an erection
- Less firm erections
- Longer time to reach orgasm
- Decreased force of ejaculation
- Fewer spontaneous erections
- Erections that are lost during sexual intercourse
- Retrograde ejaculation - semen flows into bladder, internal smooth muscle sphincter, urethral sphincter weakness
- Pain during erection, orgasm and ejaculation can occur

ED is a clinical marker for future cardiovascular disease. (Meller 2013, Orimoloye 2016, Ibrahim 2018, Elzanaty 2016)

Prevalence of ED (Meller 2013, Rosen 2004, Maiorino 2015)

- Varies 5.1% to 70.2%
- Increases with age
- United States - estimated 30 million men
- Worldwide - estimated 152 million men (approximately 322 million by 2025)
- Approximately 50% of men do not accept that they have ED
- Many do not seek treatment or do not follow through with treatment

Risk factors include

- Coronary artery disease
- Diabetes Mellitus
- Medications
- Pelvic surgery especially prostatectomy
- Radiation for prostate cancer
- Neurological conditions (Parkinson's disease, multiple sclerosis)
- Psychological conditions (depression)

Prognosis of return to erections after prostatectomy (Hamilton 2014)

Very difficult to return to full pre operative erectile function (6.7% to 32.9%) even with nerve sparing and aids at 24 months after surgery (Fode 2016)

Varies with

- Age
- Overall health
- Previous erectile function - over 50% of men had ED before surgery
- Surgical procedure - narrow dissection and nerve sparing better

Better prognosis (Rossi 20126)

- Younger
- Healthier
- Good erectile function before prostate surgery - encourage men to have erections often before surgery

Modifiable risk factors (Nehra 2012, Ibrahim 2018, Orimoloye 2016)

- Obesity
- Alcohol use
- Smoking

## Etiology (Yafi 2016, Meller 2013)

### Organic

- Neurogenic - impair nerve transmission (diabetes, Parkinson's, radiation)
- Vascular - impede blood flow (atherosclerosis, medications, radiation)
- Hormonal
- Surgical - impair nerve transmission and blood flow (Hamilton 2014)
- 50 to 80% of ED cases
- Most common in men over 50 years old

### Psychogenic

- Anxiety
- Fear
- Depression
- Stress
- Fatigue
- Most common in men under 35 years old
- Will have nocturnal erections

## Lifestyle interventions to prevent ED (Maiorino 2015)

- High level of physical activity
- Maintaining a normal weight / good diet
- Avoid smoking and excessive alcohol intake

## ED Treatment

- Depending on the cause
- First treat underlying conditions
- Medications
  - Phosphodiesterase type 5 (PDE-5) inhibitors, Alprostadil - relax smooth muscle of corpus cavernosum and increase arterial blood flow into spongy tissue of penis
  - Testosterone
  - Intracavernosal injections
- Vacuum pump device - pulls blood flow into penis
- Constricting bands - placed around the base penis keep blood in penis
- Psychological counseling and/or behavioral therapy, support groups
- Surgery / penile prosthetic devices
- Lifestyle and risk factor modification (Maiorino 2015, Krzastek 2019)
- Pelvic floor muscle training (Burgio 2013, Kannan 2018, Dorey 2010, Campbell 2012, Geraerts 2016)

## Penile rehabilitation after prostatectomy (Gandaglia 2015)

### Goal

- Improving cavernosal oxygenation
- Preserving spaces in spongy tissue
- Preventing smooth muscle contractures

### Components

- Medications
  - Low dose, daily PDE-5 inhibitor at the time the catheter is taken out to encourage small blood flow into the penis
  - Other medications and injections also used
  - Does not cause an erection
- Vacuum pump - pull blood into the penis to keep spaces in spongy tissue open and maintain / return length of penis. Approximately 55% effective
- Support and / or counseling

## Pelvic Physical Therapy Distance Journal Club - Post prostatectomy Study Group 2015

<https://pelvicptblog.wordpress.com/special-projects-2/>

Practice survey of 11 self proclaimed experts in Male Pelvic Physical Therapist from around the world

- PTs reported their patients are using
  - Medication 100%
  - Vacuum pump 89%
  - Penile injection 44%
  - Penile suppository 33%
- 78% of PTs regularly educate their patients about ED
- All PTs in this group use the same exercises for ED and urinary incontinence

## Pelvic Floor Muscle actions

- LA anterior movement of anorectal junction and lifts the base of bladder superior
- SUS moves mid urethra posterior or dorsal
- BC creates compression of the bulb, moves bulb of urethra anterior and superior

## Verbal instructions (Stafford 2015)

- LA - all instructions result in activation but mostly "tighten around the anus" followed by "stop the flow of urine"
- SUS - "shorten the penis" followed by the instruction "stop the flow of urine"
- BC - "tighten around the anus" followed by ""shorten the penis", describe squeeze out

## PFM activity in sexual function

- No basic science research
- LA - rhythmical contractions during orgasms
- SUS - ?
- BC - maintain erections, emission of semen
- All muscles must be able to relax and contract - high tone PFM

### Evaluation of erectile dysfunction

- Medical history - make sure patient is being adequately treated for conditions that increased ED such as cardiac disease and diabetes.
- Social / work / family
  - Activity level and regular exercise
  - Stable relationship with good communication
  - Reaction to stress
- Outcomes measure - International Index of Erectile Dysfunction (Rosen 1997)

### Evaluation of the male PFM

- Visualize perineal body and rectum
  - Elevation on PFM contraction
  - Decent / relaxation on bearing down
- Visualize anterior (patient and / or PT)
  - Penis moves upward
  - Tissue above penis dips inward
- External palpation
  - Tenderness / myalgia
  - Perineal body for anterior PFM contraction
  - Anterior for penile movement (patient)
- Internal palpation rectal PFM - superficial and deep
  - Resting tone
  - Strength (0/5) and endurance (# of seconds)
- Electromyography (EMG)
  - Electrode placement - peri-rectal, rectal, perineal
  - Artifact - hair, adipose tissue
  - Which muscle does it measure
- Trans abdominal and Trans perineal Imaging ultrasound (Milos2018)  
<https://www.youtube.com/watch?v=xkXsfeixq0M>
  - Quantify movement of all PFM individually
  - Which muscle is the most important for erectile function

### High tone PFM

- Increased contractile and non contractile resting tone
- Usually assessed through palpation as increased tension with or without pain (myalgia)
- Can be related to central sensitization and pelvic pain
- Co-morbidities
  - Anxiety, depression
  - Low desire and arousal
  - Decreased ability to relax in sexual situations
  - Performance anxiety

## PT treatment of ED

- Lifestyle and risk factor modification - European Association of Urologist gives a grade "A" recommendation (Maiorino 2015, Krzastek 2019)
  - Maintain proper cholesterol levels
  - Avoid recreational drugs and excessive alcohol
  - Maintain an ideal body weight
  - Quit smoking
  - Exercise regularly (Silva 2017)
- Exercise affect on ED - conflicting evidence
  - US Department of Health and Human Services 2008 Physical Activity Guidelines for Cancer survivors (Wolkin 2012)
    - At least 150 min/week of moderate-intensity activity
    - Or 75 min/week of vigorous-intensity activity
    - or an equivalent combination
    - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3543866/>
  - RCT of home based walking on anxiety, depression and cancer related symptoms (lung cancer) (Chen 2015)
    - Anxiety and depression significantly decreased in intervention group
    - 12 weeks, 40 min, 3 times per week, moderate intensity walking
  - Exercise in a group (Hamilton 2015)
    - Contributed to acceptance of sexual changes
    - Through affirming masculinity and peer support
    - In men undergoing androgen deprivation therapy for prostate cancer
  - Meta-analysis - 7 studies moderate intensity aerobic exercise improved ED (Silva 2017)
  - Exercise has a positive effect on sexual desire and sexual activity in men with prostate cancer (Cormie 2013)
- Treatments for high tone PFM
  - Relaxation training, meditation
  - Diaphragm breathing
  - Yoga
  - PFM relaxation training (EMG)
- Encouragement / support groups / Counseling
- Pelvic floor muscle training (Burgio 2013, Kannan 2018, Dorey 20106, Campbell 2012, Geraerts 2016)

## Pelvic Floor Muscle training

- Correct technique - able to active all muscles
- Avoidance of excessive intra-abdominal pressure
  - Breathing
  - Intensity - sub maximal contractions often work best
- Type of exercises – which is the best?
  - Strength
  - Endurance
  - Fast reaction
  - Functional
- Relaxation of the PFM

Pelvic floor muscle training (Burgio 2013, Kannan 2018, Dorey 2010, Campbell 2012, Geraerts 2016)

- Limited studies - consistently show PFM training with and without biofeedback and electrical stimulation are better than nothing.
- PFM training - increase the ability to obtain and maintain an erection. (Campbell 2012), (Geraerts 2016).
- Rectal sensor EMG and electrical stimulation (Van Kampen 2003)
  - Electrical stimulation - 50 Hz, 6 seconds on and 12 seconds off for 15 minutes
  - EMG - 1 second squeeze and 6 to 10 second squeeze total of 30 repetitions three times per day in a variety of positions
  - 47% normal erection and additional 24% improved,
  - Best outcome in men with venous-occlusive dysfunction.
- Recovered potency 12 months after prostatectomy (Prota 2012)
  - 47.1% in PFM exercise group (12 weeks with EMG)
  - 12.5% in the control group (PFM exercises instructed by urologist)

Journal club survey results 2015 - Points of education used in pelvic physical therapy before and after prostate surgery

- Information on PFM and sexual response
- Basic anatomy of erection and ejaculation
- Neuroanatomy - how the nerve sparing procedure works
- Why penile "rehab" is important early (to reduce fibrosis)
- Importance of vacuum pump for penile therapy to avoid atrophy and improve blood perfusion
- Expectation of when function can return - 6 months to 1.5 years for full recovery
- Psychology treatment options, support groups
- How desire and intimacy play a role
- The role of physical therapy in ED

Resources

- Us Too international support group for prostate cancer survivors and their families
- "Prostate recovery MAP" by Craig Allingham. Redsox International 2104 - patient education book
- "Life after prostatectomy and other urological surgeries 10 weeks from incontinence to continence" Vanita Gagliani Osmosis Publishing 2014 - patient education book
- Grace Dorey has several books including "Pelvic Dysfunction in Men: Diagnosis and Treatment of Male Incontinence and Erectile Dysfunction" (Wiley Series in Nursing) Paperback – 30 Jun 2006 - professional text

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