Medical and Surgical Approaches to Priapism

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Overview/Objectives

- Basic principles of management
- Surgical considerations
- Preventative strategies
Priapism is a pathological condition of a penile erection that persists beyond or is unrelated to sexual stimulation.

AFUD Thought Leader Panel, IJIR 5:S39, 2001
Significance of Priapism

- Afflicts 40% of males with sickle cell disease
- Threatens sexual health
- Exerts negative impact on physical and mental health of affected individuals
- Urges comprehensive health programmatic efforts

Historical Treatments

- Warm baths
- Cold or hot packs
- Antibiotics
- Anticoagulants
- Tobacco enemas
- Camphorated mercurial ointment
- Leeches
- Trichloracetic acid

- Sedatives
- Hypnotics
- Anesthetics
- Dorsal artery ligation
- Perineal nerve transection
- Ischiocavernosus muscle division
- Penile amputation
- Corporal incision/aspiration

Burnett AL. J Urol 170: 26-34, 2003
Types of Priapism

- **Ischemic (veno-occlusive or low flow)** - 95% prevalence
  - Stuttering (intermittent) = recurrent ischemic priapism (typically <4hr duration)

- **Non-ischemic (arterial or high flow)** – 5% prevalence
Ischemic Priapism Characteristics

- Painful
- Very firm erection, non-compressible
- Little or no cavernosal blood flow on duplex ultrasound

Blood gases:
- PO2 < 30 mm Hg
- PCO2 > 60 mm Hg
- pH < 7.25
Ischemic Priapism: Etiology

- Penile injection therapy
- Hemoglobinopathies/Sickle Cell Anemia
- Drugs (psychotropics, alpha blockers)
- Pelvic malignancies
- Metastatic tumors to corpus cavernosum
- Parenteral fat emulsion administration
- Heparin
- Idiopathic
Management Algorithm for Priapism

PRIAPISM*

History & Physical

- Simultaneous treatment of any underlying disease (e.g., sickle cell disease)
- Cavernous Aspiration with Blood Gas or Doppler Ultrasound

Ischemic

- Aspiration with or without irrigation → Phenylephrine
- Distal Shunting
  - Repeat Distal or use Proximal Shunting

Nonischemic

- Observation
  - Arteriography & Embolization
  - Surgical Ligation

*Erection greater than 4 hours duration.
*Proceed upon treatment failure.
Ischemic Priapism: Management

- Manage underlying causes together with intracavernosal treatment
- Aspiration and irrigation of corpora
- Injection of sympathomimetic agents
- Consider Shunt (Distal v Proximal)
- Consider Prosthesis placement (remains controversial)
Surgical Shunting

Objective

Re-establish outflow from the corpora cavernous bodies by creating a communication to the glans, corpus spongiosum, or a vein

Categories

- Percutaneous distal shunts
- Open distal shunts
- Open proximal shunts
- Vein anastomoses (saphenous, superficial/deep dorsal)

“Distal” Shunt Options: Percutaneous Techniques

Surgical Shunt Options: “Proximal” and Venous Bypass Techniques

Quackles/Sacher

Grayhack

A cavernosal dilator (#7 Hegar) is retrogradely inserted through excised tunical windows of the distal corpora cavernosa after transglanular incision.

Burnett AL, Pierorazio PM. J Sex Med 6:1171-6, 2009
To create tunneling of the corpora cavernosa, a straight 20-24 urethral sound or dilator is inserted through each glans incision and advanced to the penile crura.

Role of Penile Prosthesis Surgery: Recommendations of International Consultation on Sexual Medicine 2009

Indications

- Failed aspiration and sympathomimetic intracavernous injection
- Failed distal and proximal shunting
- Presence of ischemia > 36 hours
- Management of confirmed ED (delayed setting)

Optional Procedures (to document corporal smooth muscle necrosis)

- Magnetic Resonance Imaging prior to surgery
- Corporal biopsy at surgery

Current Clinical Management Principles

Precept: Prompt recognition
Approach: Reaction
Actions: Serial procedures
Objective: Resolution
Revised Clinical Management Scheme

Precept: Prompt recognition → Universal precaution

Approach: Reaction → Prevention

Actions: Serial procedures → “Mechanism-specific” therapies

Objective: Resolution → Functional preservation

The future of priapism management calls for comprehensive, preventative care based on scientifically studied and supported interventions that maximally preserve intact erectile ability.

Science of Recurrent Ischemic Priapism: Phenomenon No Longer a Medical Mystery

- Evolution of understanding based on science of erection physiology
- “Sludging of erythrocytes” is not the fundamental pathophysiology
- Opportunity for prevention or correction
Mechanism of Priapism:
Erections are Uncontrolled

Molecular Pathophysiology of Recurrent Ischemic Priapism: Nitrergic Signaling Derangements

- Deficiency in Nitric Oxide bioavailability
- Oxidative Stress
- Phosphodiesterase Type 5 (PDE5) expression/activity downregulation

PDE5 Inhibition for Priapism Prevention: A Different Therapeutic Scheme

- For inducing erections:
  - Erectogenic agent
  - Combine with sexual stimulation
  - Promote cGMP-dependent cavernosal tissue relaxation

- For controlling priapism:
  - Molecular signaling modulator
  - Unassociated with sexual stimulation
  - Restore normal penile vascular homeostasis

Practical Use of PDE5 Inhibitors for Priapism Prevention

- Sildenafil 25-50mg, daily under conditions of complete penile flaccidity

- Therapy administered in the morning-time to avoid priapism risk with nocturnal (i.e. sleep-related) erections

- Because successful response may require 2-3 weeks, patient self-injection with a sympathomimetic agent (e.g. phenylephrine) may be necessary temporarily
Cycle of Pathogenic Factors

NO Imbalance
- Constitutive Endothelial NO Bioactivity Decrease

Oxidative Stress
- Reactive Oxygen Species Generation
- Lipid Peroxidation

Anoxia
- Cytokine Induction
- Inflammatory Response

Priapism

Penile Vasculopathy
- PDE5 Dysregulation
- Rho-kinase Inactivation

Bioactivity Decrease
New Therapeutic Directions
Ongoing Molecular Science

- Novel nitrergic effectors
  - Hydroxyurea
  - Sustained Nitric Oxide donors
  - Nitrate supplementation

- Oxidative stress regulators

- Other molecular pathways
  - rhoA/rho-kinase
  - adenosine
  - opiorphin
  - testosterone
Management Paradigm for Recurrent Ischemic Priapism

1st Line
- Treatment of SCD or underlying condition (e.g. hydroxyurea)
- Restoration of normal HPG axis (e.g. TRT)

2nd Line
- Regimented PDE5i
- S-ARI
- Phenylephrine self-injection

3rd Line
- Digoxin
- Peripheral androgen ablation

Acute management
- Phenylephrine injection
- Corporal aspiration
- Distal shunts as needed

Joice GA, Liu JL, Burnett AL. BJUI, 2021
Conclusions

- Early recognition and prompt intervention are mainstays of priapism management.
- Clinical treatment refractory presentations of ischemic priapism merit consideration for surgical intervention.
- Corrective and/or preventative strategies for priapism will arise from further study of molecular mechanisms.
Priapus, God of Fertility and Gardens

House of Vittei, Ruins of Pompei