Dorsal Vein Sacrifice during Radical Prostatectomy: A Possible Contributing Cause of Erectile Dysfunction?

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Objectives

- To present the rationale for invoking therapeutic strategies for enhancing erectile function recovery after radical prostatectomy

- To assess possible therapeutic strategies for this purpose (targeting dorsal vein ligation)
  - Benefit? Harm? Neither?
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Radical Prostatectomy and ED

- Surgery offers excellent long-term rates of cancer control\(^1\)
- ED is a historically known significant complication of the surgery
- Cavernous nerve-sparing techniques have reduced ED to 15-40%\(^2\)
- Other morbidities largely controlled today

“If it were possible to cure prostate cancer with surgery with few or no side effects there would be less debate on how patients should be treated.”
Possible Mechanisms for Erection Loss after Radical Prostatectomy

- Surgical Trauma
  - Neural injury
  - Vascular injury
- Psychosocial Factors
  - Depression, anxiety
  - Relationship circumstances
- Health Co-morbidities
  - Cardiovascular disease states
  - Age
Basic Concepts for Preserving Sexual Function

- Minimize dysfunction
- Treat ED
- Promote EF recovery
  - Rehabilitation, e.g., ED interventions be protocol
  - Protection, e.g., neuro/vasculoprotective therapies
  - Reconstitution, e.g., nerve regeneration, tissue reconstruction
Anatomic Radical Prostatectomy

**Anatomical Discoveries**
- Dorsal vein complex anatomy
- Autonomic innervation of the corpora cavernosa
- Pelvic fascia anatomy
- Anatomy of the striated sphincter continence mechanism

**Surgical Outcomes**
- Surgical performance in bloodless field
- Reduced sexual dysfunction postoperatively
- Surgical approach, with wide excision when necessary
- Reduced urinary incontinence postoperatively

Blood flow mechanics and tissue physical properties of the penis are key factors in the production of penile erection.

Netter FH. The CIBA Collection of Medical Illustrations, Vol 2, 1954
Anatomical Relationships of the Dorsal Vein of Penis

Suprapubic and lateral views of the pelvis showing the venous system at the prostatourethral junction.

Reiner WG, Walsh, PC. J Urol 1979;121:198-200
Dorsal Vein Ligation During Radical Prostatectomy

Suprapubic and lateral views of the pelvis showing ligation of the dorsal vein; note lateral plexuses are not ligated.

Reiner WG, Walsh, PC. J Urol 1979;121:198-200
Penile Venous Surgery

- **Rationale:** excessive venous flow during erection constitutes veno-occlusive dysfunction and equates with ED
- Clinical reports suggest 50-80% success rate for correction of “venogenic ED” by ligating the dorsal vein and its tributaries
- Clinical follow-up after “venous leakage surgery” indicates concern as a long-term treatment modality (>80% failure rate at mean 9.4 months)
- Penile venous surgery is not recommended for men with ED (AUA Guidelines)

Venous Drainage of the Penis after Radical Prostatectomy

- Dorsal Venous Complex
  - 100% of patients showed changes in the DVC
  - 50% had distal obliteration
  - 16.7% showed complete obliteration

CT cavernosography in 12 patients with ED

Trussler J, McCullough A et al, 2019
Venous Drainage of the Penis after Radical Prostatectomy

CT images with 3D reconstruction

Trussler J, McCullough A et al, 2019
Outcomes after Anatomic Radical Prostatectomy

LIKELIHOOD OF UNDETECTABLE PSA

How successful is radical prostatectomy? These long-term results correlate PSA levels after surgery, potency and the actual extent of cancer (as determined by a pathologist). They also prove that the odds of cure are just as high when potency is preserved.

Organ Confined

Capsular Penetration

Capsular Penetration—Surgical Margin Negative

Capsular Penetration—Surgical Margin Positive

Conclusions

 Radical prostatectomy provides effective control for clinically localized prostate cancer.

 Reduced patient complications such as improved erection recovery accounts in part for the utility of the surgery.

 With respect to post-radical prostatectomy erectile dysfunction, evidence is inconclusive whether dorsal venous ligation constitutes a benefit or harm.

 Continued emphasis on understanding surgical factors associated with erectile dysfunction and developing surgical modifications should lead to further improved outcomes.