Complications After Prostate Artery Embolization

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Review Article

Current Status of Prostate Artery Embolization for Lower Urinary Tract Symptoms: Review of World Literature

Patrick Jones, Bhavan Prasad Rai, Rajesh Nair, and Bhaskar K. Somani

Complications (%)

Minor: urethral burning (82), rectal bleeding (27), diarrhea (18), hematuria (9)

Major: nil

Minor: urethral burning (9.2), UTI (1.2), hematuria (5.6), hematospermia (4), rectal bleeding (2.4), balanitis (1.6), AUR (2.4)

Major: bladder ischemia (0.4)

Minor: hematospermia (16), transient increase in urinary frequency (42)

Major: nil

Minor: hematospermia (1.09)

Major: nil

Minor: postembolization syndrome (11.1), UTI (1.9), pelvic pain (1.9), AUR (25.9)

Major: nil

Minor: hematospermia (5.9), rectal bleeding (5.9), diarrhea (2.9), urethral trauma (2.9)

Major: persistent UTI requiring intravenous antibiotics (2.9)

Minor: urethral burning (16.7), hematuria (11.7), hematospermia (11.7), rectal bleeding (10), AUR (28.3)

Major: nil

Minor: urethral burning (10.2), hematuria (8.2), hematospermia (8.2), rectal bleeding (8.2), AUR (10.2)

Major: nil
PAE Complications

Related to:

- Foley balloon technique (placement)
- Vascular access (femoral x radial)
- Pelvic vascular anatomy
- Prostatic artery anatomy
- Operator skills and catheters/wires
- Embolization Technique
- Embolic agent (type and size)
- Radiation exposure
- Prostate anatomy (tissue) changes
Complications Related to the Foley Balloon Technique
PAE Complications

Related to Foley Balloon Technique

- Urethral trauma during placement
  - Pain and bleeding

- Median lobe trauma during inflation
  - Pain and bleeding (indwelling 7 days)

- Urinary tract infection

- Removal (Foley) after PAE
  - Immediately after PAE x Overnight
PAE Complications

- Related to Vascular Access
  - Femoral (unilateral)
  - Femoral (bilateral)
  - Radial
Vascular Access Complications

Femoral

Radial

Spasm and Occlusion

Vascular Access Site Complications (VASCs)

Bleeding complications
- local superficial hematoma
- groin hematoma
- retroperitoneal-pelvic hematoma
- arterial dissection-thrombosis-occlusion
- pseudoaneurysm
- arteriovenous fistula
- distal embolization

Combination of bleeding and vascular complications
- nerve damage-irritation
- infection-abscess formation
- lymphocele formation

Local complications
PAE Complications

Related to Pelvic Vascular Anatomy

- Tortuosity
- Arterial stenosis
  - Plaques and ulcers
- Arterial occlusion
  - Internal iliac artery
- Arterial anastomosis

PAE Complications

Related to Pelvic Vascular Anatomy

Tortuosity

Stenosis and Occlusions

**PAE Complications**

- Related to Pelvic Vascular Anatomy
  - Pelvic arterial anastomosis
PAE Complications

- Related to Prostatic Artery Anatomy
  - Occlusion
  - Stenosis
  - Tortuosity
  - Diameter
  - Number of arteries (8%)
  - Anatomical variations (6.7%)

PAE Complications

Related to Operator Skills and Catheters/Wires

- Femoral access
- 5-Fr catheter
- Microcatheter < 2.4 Fr
- Microwire 0.014” or 0.016”
- CBCT should be used NOT ONLY for safety
- Calibrated microspheres
- Closure devices
PAE Complications

Related to Embolization Technique

- Proximal embolization
  - Non-target to rectum, bladder, penis, seminal vesical, muscle or bone
  - Or, any other collateral branch
- PErFecTED
  - Non-target to collateral shunts due to “wedged injection”
PAE Complications

Related to Embolization Technique

- Proximal embolization

SVA - IVA anastomosis

MRA
PAE Complications

Related to Embolic Agent

- PVA x Calibrated Microspheres
  - Less deeper penetration
  - Higher risk of microcatheter obstruction
  - Higher risk of proximal PA occlusion

- < 300 micron
  - More adverse events
  - Higher pain level
  - Risk on non-target embolization

Comparative study using 100-300 versus 300-500 μm microspheres for symptomatic patients due to enlarged-BPH prostates.
PAE Complications

- Non-target embolization (Bladder)
  - Bladder necrosis

“Patient felt intra-procedural pain and later developed a small area of bladder wall ischemia. ...the prostatic arteries had a proximal origin near the branches of the inferior vesical artery. **Surgical removal of the 1.5-cm\(^2\) zone** of ischemia of the bladder wall.”
PAE Complications

- Non-target embolization (Bladder)
  - Transient bladder ischemia

1\text{st} month
3\text{rd} month
1\text{st} year
2\text{nd} year

PAE Complications

- Non-target embolization (Rectum)

Non-target embolization (Seminal vesical)
- Transient hematospermia
PAE Complications

- Non-target embolization (Bone)
  - Asymptomatic and transient
  - 3-month MRI follow-up
PAE Complications

- Non-target embolization (Bone)
PAE Complications

Radiation Exposure

- Radiodermitis

PAE Complications

Radiation Exposure

- Reduce Radiation
  - Learning curve and prostate anatomy
  - Image-hold, collimation and pulsed fluoroscopy
  - Adequate equipment and materials
  - Reduce DSA and work in systematic fashion
  - Trained in microcatheterization techniques
  - Procedure planning

PAE Complications

Prostate Anatomy (Tissue) Changes

- Expelled prostatic tissue (...AUR)
PAE Complications

Prostate Anatomy (Tissue) Changes

- Prostatic Tissue Expulsion after Prostatic Artery Embolization – LETTER TO THE EDITOR

PAE Complications

Prostate Anatomy (Tissue) Changes

- “The valve effect” – intermittent uroflow over the internal orifice in patient with asymmetric median lobe protrusion

Before PAE

After PAE

Ischemic BPH median lobe

Valvular mechanism

USP data – not published
PAE Complications

- Ejaculation
- Transient Hematochezia
- Transient Hematuria
- UTI
- Transient Hematospermia
- Diarrhea
- Pubic Ischemia
- Urinary Retention
- Badder Necrosis
- Prostatitis
- Urinary Incotinence
- Hematoma

USP
Pisco et al.
Kurbatov et al.
Bagla et al.
Gao et al.
Sapoval et al.
Isaacson et al.
PAE Complications

**Take-home Message**

- Prostate artery embolization for symptomatic patients with enlarged-prostates due to BPH has been performed all over the world with low complication rates, however, there is a potential for severe complications.
Work in a multidisciplinary team