2025 AUA Review Course: Urologic Trauma, Urethral Stricture Disease, and Male Stress Incontinence

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Disclosures

- Boston Scientific – Consultant
- Coloplast – Consultant

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Official Journal of the American Urological Association

Urotrauma: AUA Guideline

Allen F. Morey, Steve Brandes, Daniel David Dugi III, John H. Armstrong, Benjamin N. Breyer, Joshua A. Broghammer, Bradley A. Erickson, Jeff Holzbeierlein, Steven J. Hudak, Jeffrey H. Pruitt, James T. Reston, Richard A. Santucci, Thomas G. Smith III and Hunter Wessells

From the American Urological Assocation Education and Research, Inc., Linthicum, Maryland

Urotrauma Guideline 2020: AUA Guideline

Allen F. Morey,* Joshua A. Broghammer, Courtney M. P. Hollowell, Maxim J. McKibben and Lesley Souter

0022-5347/14/1922-0327/0
THE JOURNAL OF UROLOGY®

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Vol. 192, 327-335, August 2014
Printed in U.S.A.

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Case

- S.D. 24-year-old falls from skateboard
- Gross hematuria x 2, voiding easily, no clots, painless
- Large ecchymotic area noted on R flank
- HCT 28, Cr 1.2
- **Stable**

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Adult BLUNT Renal Trauma:

Who Needs Immediate Imaging?

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Renal – whom to image

1. "…Perform diagnostic imaging with IV contrast enhanced CT in stable blunt trauma patients with gross hematuria or microscopic hematuria and SBP < 90mmHG".

(Standard; Evidence Strength: Grade B)

Also a quick word about nomenclature for this talk…

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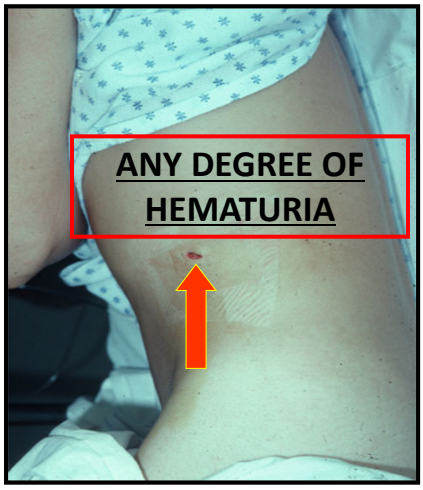
Penetrating Trauma: Higher Index of Suspicion



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Renal Imaging for Signs and Symptoms

2. "…Perform diagnostic imaging with IV contrast enhanced CT in stable trauma patients with mechanism of injury or PE findings concerning for renal injury".

(Recommendation; Evidence Strength: Grade C)

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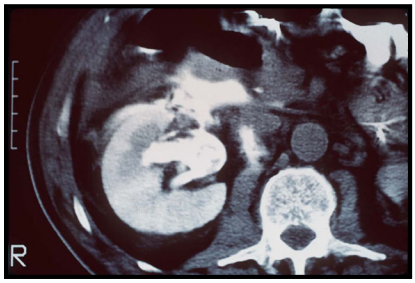
Renal Trauma Staging (CT): Immediate and Delayed Phases

2 Phase Contrast CT

- –Vascular (30-45 sec)
- –Excretory (5-10 min)



BJU Intl 2004:94

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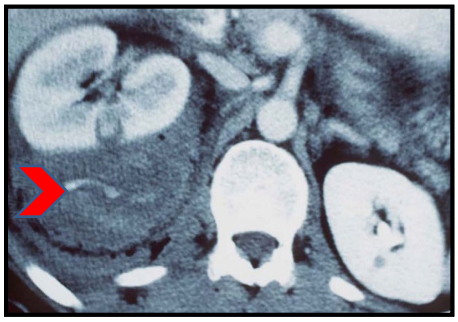
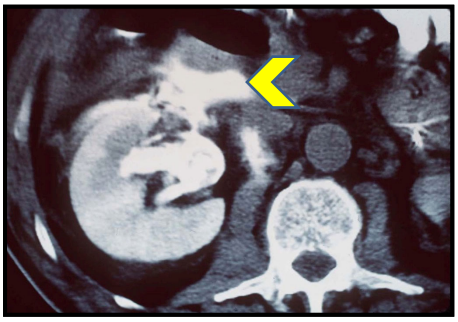
Renal Trauma Imaging:
Abd/Pelvic CT with Immediate + Delayed Views



Intravascular Contrast Extravasation



Urinary Extravasation

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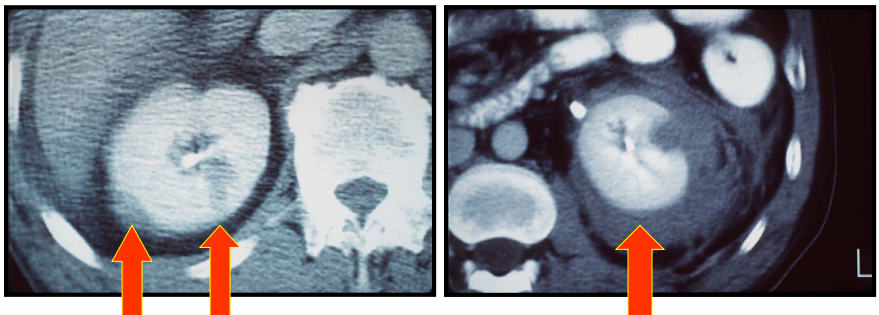
Grade 1 & Grade 2 Injury:
Observation

Grade 1

Grade 2



Contusion

Perinephric hematoma

Subcapsular hematoma

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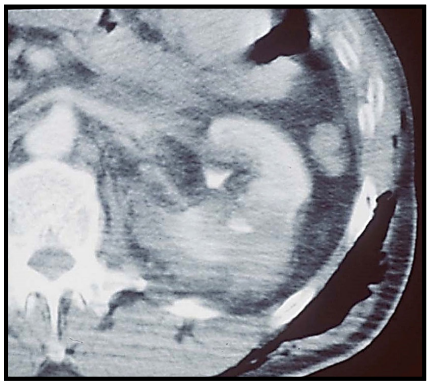
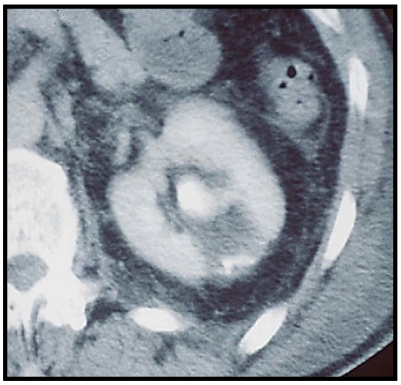
Blunt Grade 3 Injury: Observe



> 1 cm



1 week later

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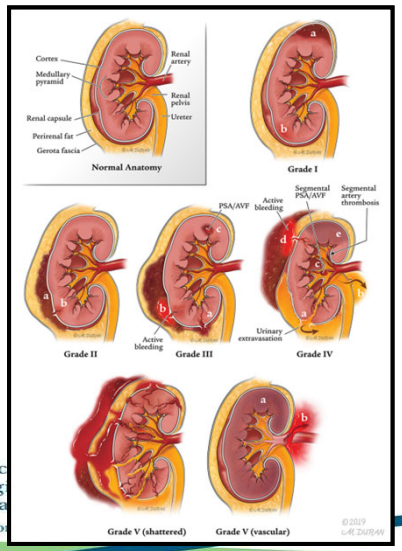
Definitions Evolve Over Time



2018 AAST Update: Here are the Big Ones to Know

Grade IV:

- Laceration into urinary collecting system
- Segmental artery/vein injury or thrombosis
- Renal Pelvis Injury

Grade V:

- Shattered kidney
- Main renal artery or vein injury / avulsion

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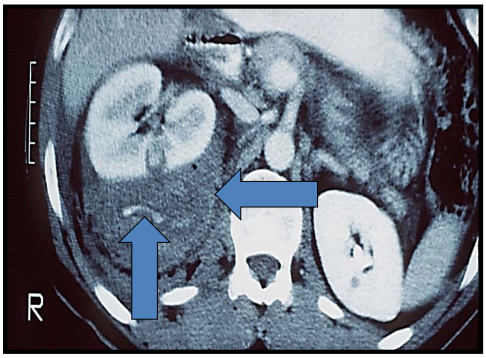
Grade 4 Lacerations More Variable

(And thus more likely "Testable"…)

Grade 4

Grade 4



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Trauma/Reconstruction/Diversion

American Association for the Surgery of Trauma Grade 4 Renal Injury Substratification Into Grades 4a (Low Risk) and 4b (High Risk)

From the Departments of Urology and Radiology (JHP), University of Texas Southwestern Medical Center, Dallas, Texas

3 Risk Factors:

1. Perirenal hematoma ≥ 3.5 cm
2. Complex/medial laceration
3. Intravascular Contrast Extravasation (ICE)

Low risk: 0 or 1 risk factor

High risk: ≥ 2 risk factors

Dugi et al, J Urology 2010;183

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High Grade Renal Injuries: Application of Parkland Hospital Predictors of Intervention for Renal Hemorrhage

Miranda J. Hardee, William Lowrance, William O. Brant,* Angela P. Presson, Mark H. Stevens and Jeremy B. Myerst†

Vol. 189, 1771-1776, May 2013
Printed in U.S.A.

From the Division of Urology, Department of Surgery (MJH, WL, WOB, JBM), Center for Reconstructive Urology and Men's Health (MJH, WL, WOB, JBM) and Division of Epidemiology (APP), University of Utah, Salt Lake City and Department of Surgery, Intermountain Medical Center (MHS), Murray, Utah

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Risk factors in 115 patients by intervention

	Intervention	No Intervention	p Value
No. pts	8	107	—
Median gm/dl initial hemoglobin (IQR)	12 (10–14)	14 (12–15)	0.23 (Wilcoxon rank sum test)
No. perinephric hematoma (%):		—	0.0099 (Fisher exact test)
Greater than 3.5 cm	4 (27)	11 (73)	
3.5 cm or Less	4 (4.0)	96 (96)	
No. laceration (%):			0.45 (Fisher exact test)
None	1 (7.1)	13 (93)	
Medial	3 (8.6)	32 (91)	
Lat	0	25 (100)	
Complex/both	4 (9.8)	37 (90)	
No. vascular extravasation (%):			<0.001 (Fisher exact test)
Yes	6 (27)	16 (73)	
No	2 (2.2)	91 (98)	
No. risk factors (%):			<0.001 (Cochran-Armitage trend test)
0	1 (3.4)	28 (97)	
1	1 (1.5)	66 (99)	
2	2 (18)	9 (82)	
3	4 (50)	4 (50)	

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External Validation of a Substratification of the American Association for the Surgery of Trauma Renal Injury Scale for Grade 4 Injuries

Bradley D Figler, MD, Bahaa S Malaeb, MD, Bryan Voelzke, MD, MS, Thomas Smith, MD, Hunter Wessells, MD, FACS

Journal of the American College of Surgeons

Table 1. Patient Demographics, Stratified by Presence of High-Risk Criteria

Characteristic	0-1 Risk factors (n = 68)	≥2 Risk factors (n = 19)	All patients (n = 84)	p Value
Mean age, y (SD)	32.1 (18.9)	34.9 (22.4)	32.7 (19.6)	0.63
Sex, n (%)				0.43
Male	41 (62)	13 (72)	54 (64)	
Female	25 (38)	5 (28)	30 (36)	
Mean ISS (SD)	28.2 (17.3)	27.6 (13.1)	28.1 (16.4)	0.88
AAST Grade 4, n (%)				0.001
Laceration	54 (99)	14 (78)	79 (94)	
Hilar injury	1 (2)	4 (22)	5 (6)	
Solem or liver injury, n (%)	28 (42)	7 (39)	35 (42)	0.79
Intervention, n (%)	4 (6)	10 (56)	14 (17)	<0.001
Nephrectomy	1 (2)	2 (11)	3 (4)	0.05
Angiography only	2 (3)	2 (11)	4 (5)	0.15
Angioembolization	0	5 (28)	5 (6)	<0.001
Mean length of stay, d (SD)	9.4 (12.7)	12.1 (16.3)	10.0 (13.5)	0.52
Readmission, n (%)	2 (3)	3 (17)	5 (6)	0.03
Mean follow-up, mo (SD)	1.9 (3.0)	2.1 (2.4)	2.0 (2.9)	0.76
Renal loss, n (%)	7 (11)	6 (33)	13 (16)	0.11
Death, n (%)	5 (8)	1 (6)	6 (7)	0.77

AAST, American Association for the Surgery of Trauma; ISS, Injury Severity Score.

Vol. 217, No. 5, November 2013

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Guideline Update 2020

Guideline Statement 5b

5b. For hemodynamically unstable patients with radiographic findings of large perirenal hematoma (>4 cm) and/or vascular contrast extravasation in the setting of deep or complex renal laceration (AAST Grade 3-5), surgeons should perform immediate intervention (angioembolization or surgery). (Recommendation; Evidence Strength; Grade C)

New Guideline Statement 2020

External Validation of a Substratification of the American Association for the Surgery of Trauma Renal Injury Scale for Grade 4 Injuries

Bradley D Figler, MD, Bahaa S Malaeb, MD, Bryan Voelzke, MD, MS, Thomas Smith, MD, Hunter Wessells, MD, FACS

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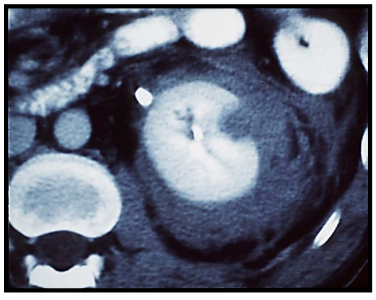
Renal Trauma Management

4. **Should** use non-invasive management if hemodynamically stable (***Standard, Grade B***)



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Renal

5. Must perform <u>immediate intervention</u> (surgery or angioembolization in selected situations) in <u>hemodynamically unstable</u> patients with no or transient response to resuscitation. **(Standard; Evidence Strength: Grade B)**

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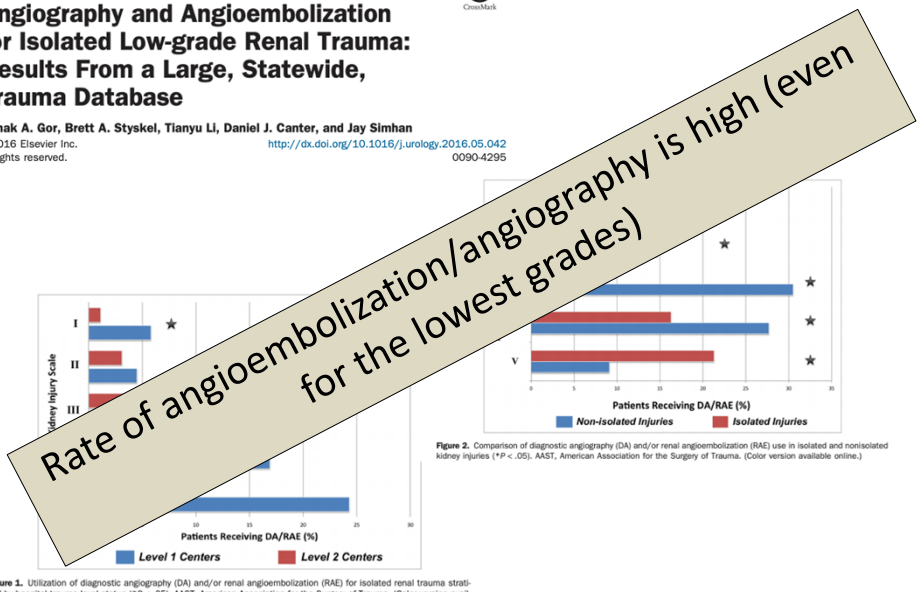
Health Services Research

Unexpected High Rates of Angiography and Angioembolization for Isolated Low-grade Renal Trauma: Results From a Large, Statewide, Trauma Database

Ronak A. Gor, Brett A. Styskel, Tianyu Li, Daniel J. Canter, and Jay Simhan

http://dx.doi.org/10.1016/j.urology.2016.05.042
0090-4295



Rate of angioembolization/angiography is high (even for the lowest grades)

Figure 1. Utilization of diagnostic angiography (DA) and/or renal angioembolization (RAE) for isolated renal trauma stratified by hospital trauma level status (*$P < .05$). AAST, American Association for the Surgery of Trauma. (Color version available online.)

Figure 2. Comparison of diagnostic angiography (DA) and/or renal angioembolization (RAE) use in isolated and nonisolated kidney injuries (*$P < .05$). AAST, American Association for the Surgery of Trauma. (Color version available online.)

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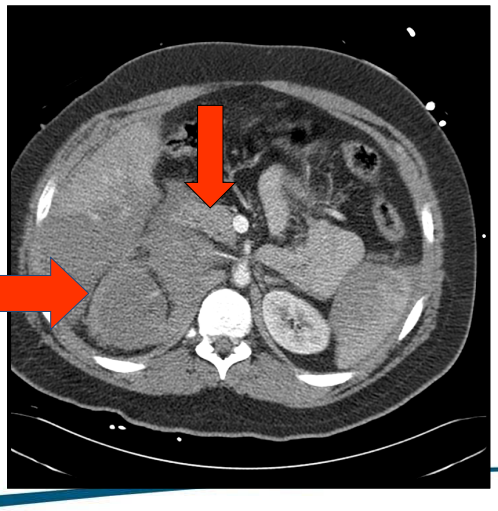
What Is Your Diagnosis?
(Hint: MVA, Deceleration Injury)

Assess the clues:

See Renal Hilum

Right Kidney Lacks Arterial Inflow



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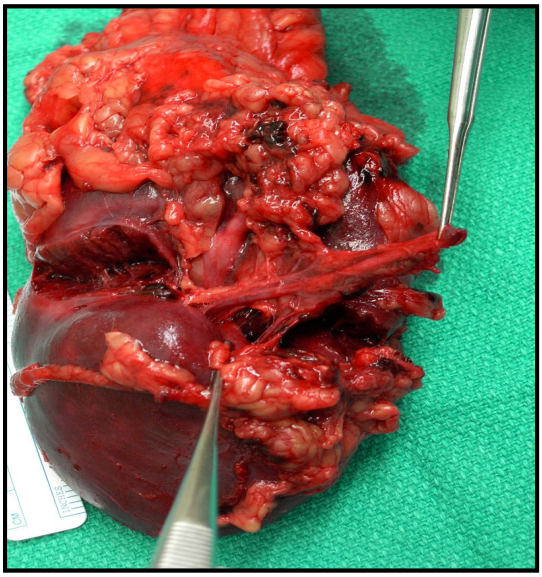
Renal Pedicle Avulsion



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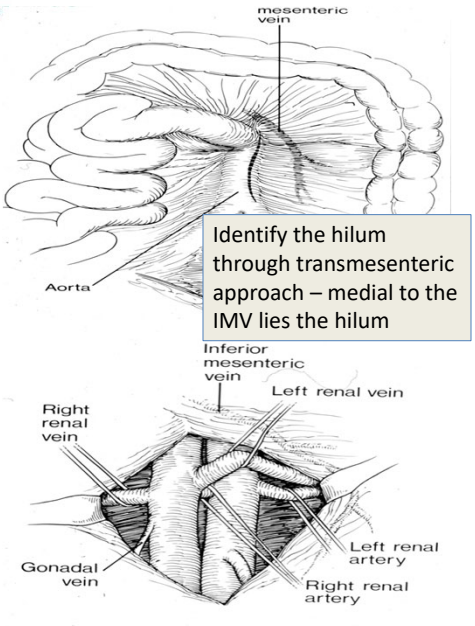
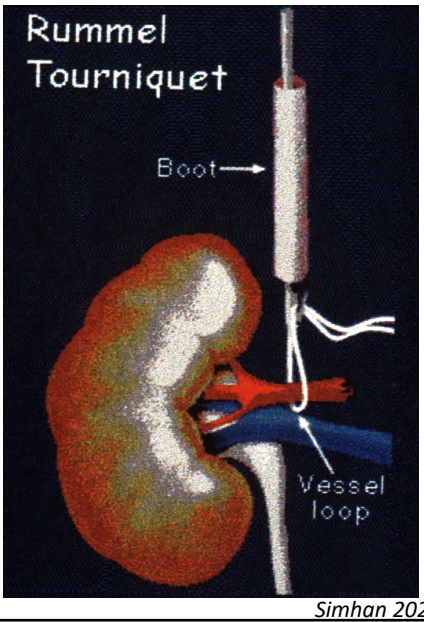
Vascular control



Identify the hilum through transmesenteric approach – medial to the IMV lies the hilum



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Is Follow-up Renal Imaging Necessary?

7. …Perform follow-up CT imaging for renal trauma patients having either

(a) Deep lacerations (AAST Grade IV-V)

(b) Clinical signs of complications

(i.e. fever, worsening flank pain, ongoing blood loss, abdominal distention)

(Recommendation; Evidence Strength: Grade C)

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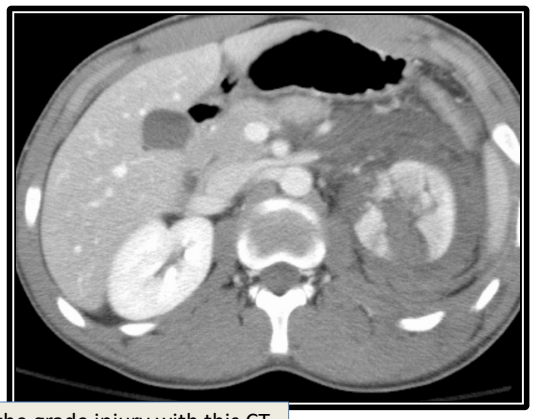
Grade 3 Renal Injury after MVA

Perinephric hematoma + <u>No</u> extrav. on delayed images

Treatment?



Note: You cannot determine the grade injury with this CT scan image alone – you need to know if there is urinary extravasation or not (if there was extravasation, this would be a grade 4 injury)

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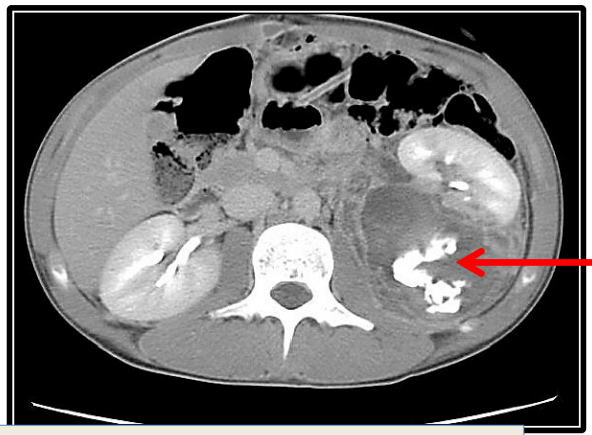
Follow Up CT at 72 Hrs for Fever



Active Urinary Extravasation

Note: By AUA guidelines, the reason to get imaging is due to clinical deterioration. If Grade IV or V injury (not the case here), should get repeat imaging reflexively.

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Interventions for Renal Injury Complications

8. “Perform urinary drainage in the presence of complications such as:

- enlarging urinoma, fever
- increasing pain
- ileus, urinary fistula or infection”

(Recommendation; Evidence Strength: Grade C)

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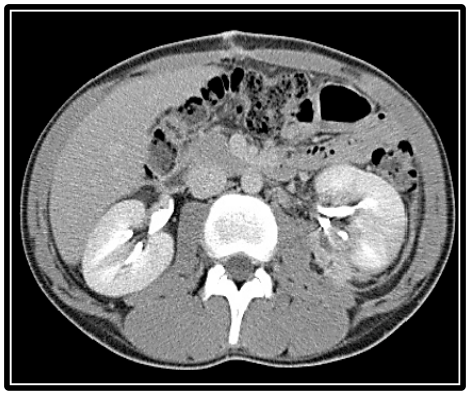
Post Embolization: Stent, Foley, Drain



1 Month Later

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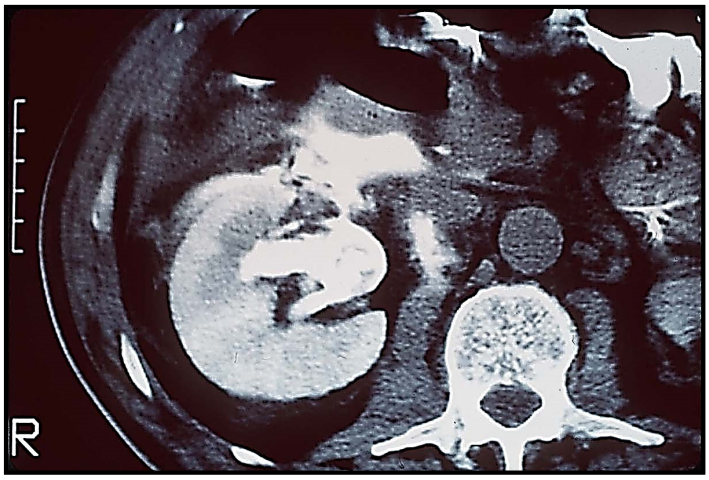
Urinary Extravasation:
Usually Safely Observed – but needs to resolve!



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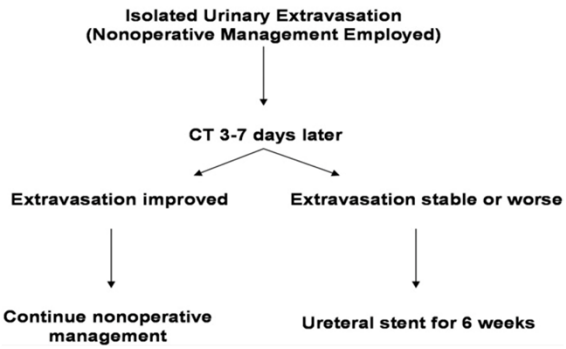
Trauma/Reconstruction/Diversion

Nonoperative Management Outcomes of Isolated Urinary Extravasation Following Renal Lacerations Due to External Trauma

Nejd F. Alsikafi,* Jack W. McAninch,† Sean P. Elliott and Maurice Garcia

From the Department of Urology, Mount Sinai Medical Center and University of Chicago Medical Center, Chicago, Illinois, and San Francisco General Hospital and University of California, San Francisco, San Francisco, California



10%

FIG. 1. Management algorithm for isolated urinary extravasation following renal trauma.

THE JOURNAL OF UROLOGY®

Vol. 176, 2494-2497, December 2006

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Critical Points for Kidney Trauma

- Know the AAST – Grades dictate treatment
- Stabilize the patient – save nephrons when possible!
- Angiography/Surgery for unstable patients
- Reimage higher grade injuries after 48-72 hrs

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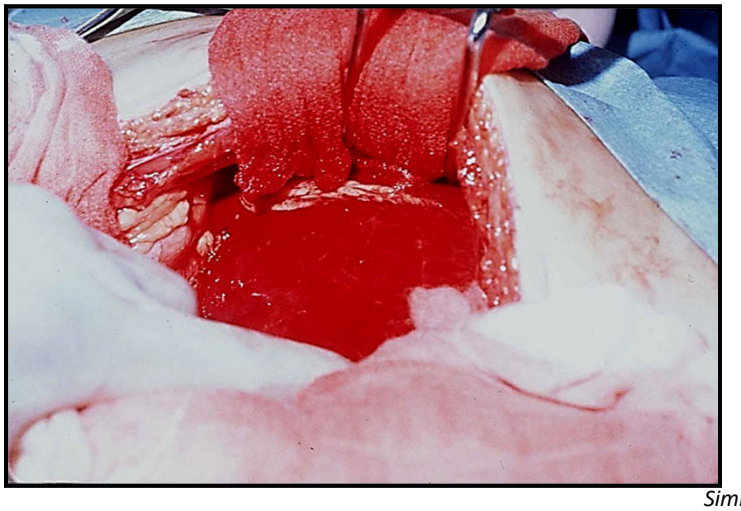
Intraoperative Consult: Retroperitoneal Hematoma?



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Indications for Renal Exploration

Absolute	Relative
• Hemodynamic instability • **Expanding pulsatile** hematoma • Major injury solitary kidney	• Non-viable tissue • **Persistent** Urinary extravasation • Renal artery • Surgery for associated injury

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IntraOp One Shot IVP

- Bolus injection of contrast 2cc/kg
- Plain film after 10 minutes
- Confirms presence of contralateral kidney
- May have to wait longer longer for hypotensive patient. (Spiral CT problem)

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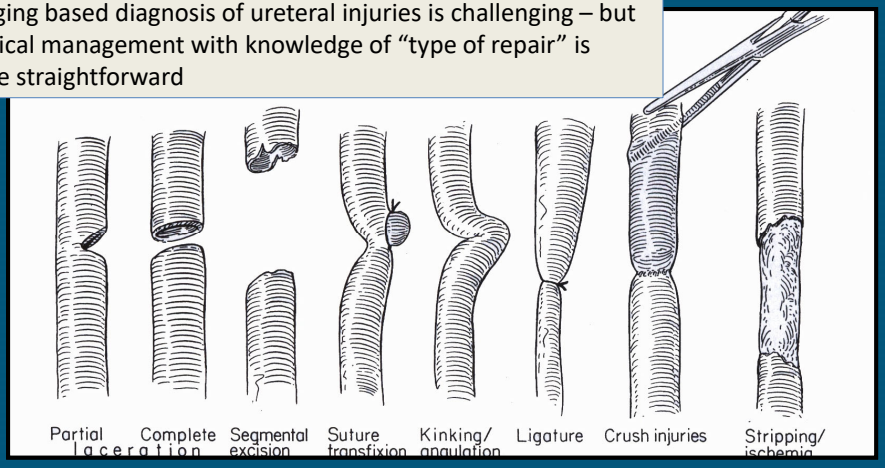
Many Ureteral Traumas are Iatrogenic

Imaging based diagnosis of ureteral injuries is challenging – but surgical management with knowledge of "type of repair" is more straightforward



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Ureteral Trauma Imaging

9a. Clinicians should perform IV contrast enhanced abdominal/pelvic CT with delayed imaging (urogram) for stable trauma patients with suspected ureteral injuries. **(Recommendation; Evidence Strength: Grade C)**

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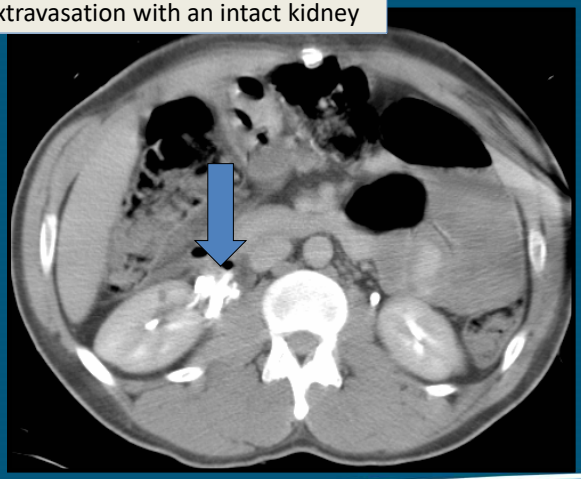
CT More Sensitive Than IVP: Should Include 10 Minute View

Notice ureteral extravasation with an intact kidney



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J Urol 2003, 170:1213 (SFGH)

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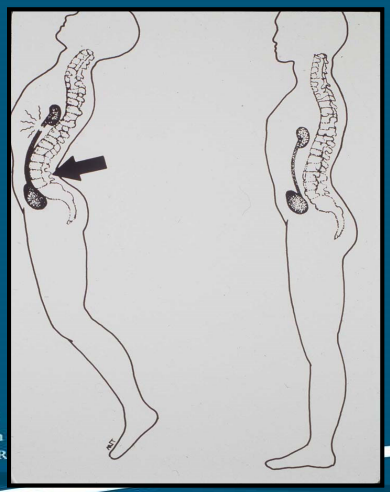
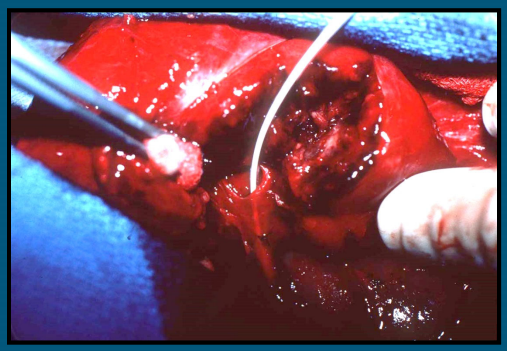
UPJ Disruption – usually in peds and rapid deceleration event





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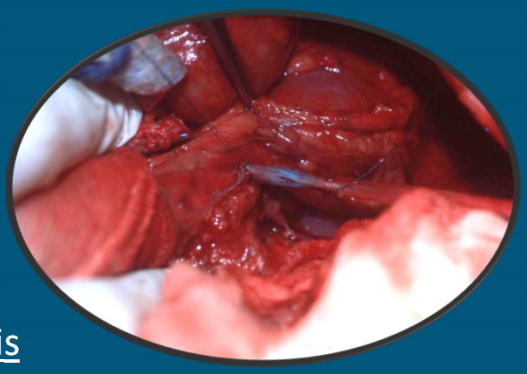
Ureteral Injury Diagnosis: Surgical Exploration

- IV or intra-ureteral indigo
- Contused or bruised ureter
- Wall discoloration, no capillary refill, no bleeding edge
- Most reliable method is direct inspection



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Ureter

9b. "…Directly inspect the ureters during laparotomy in patients with suspected ureteral injury who have not had preoperative imaging" **(Clinical Principle)**

- Direct exploration is the "best" method to diagnose intraoperative ureteral injury
- Best imaging study = Retrograde pyelogram

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False Negative IVP

IVP is a notoriously poor study to diagnose traumatic ureteral injury

This patient had a "negative IVP" but was found to have a ureteral transection

LUQ GSW→ > 50% Ureteral Transection

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Ureteral Stent for Traumatic Injury

11a. Surgeons **should** attempt ureteral stent placement in patients with incomplete ureteral injuries diagnosed postoperatively or in a delayed setting. **(Recommendation; Evidence Strength: Grade C)**

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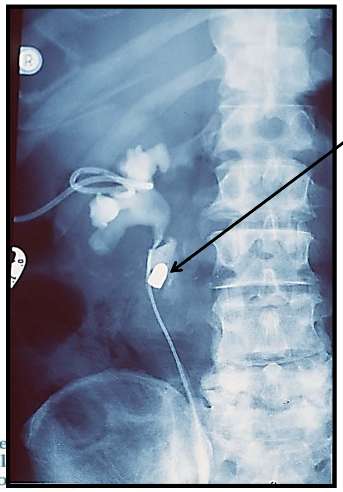
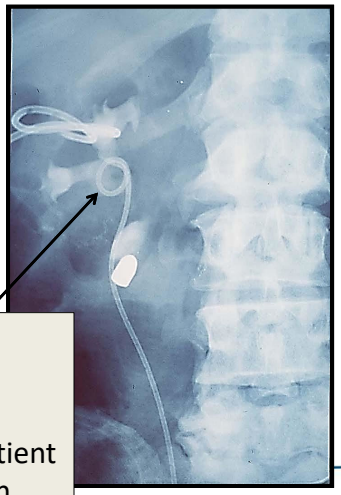
Endoscopic Management



Partial ureteral injury noted secondary to "blast" effect from GSW



JJ stent successfully placed for partial ureteral injury
(See though that patient temporized first with PCN.)

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Ureteral Contusion

10c. "Surgeons should manage traumatic ureteral contusions at the time of laparotomy with ureteral stenting or resection and primary repair (EPA) depending on ureteral viability and clinical scenario".

(Expert Opinion)

- Stent OK if low-velocity GSW
- Resect and repair if contusion severe

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Timing of Ureteral Repair: When Is Injury Recognized?

- Intraoperative
  - Immediate repair preferred
- < 5 days & stable
  - Retrograde pyelogram + Stent preferred
  - Immediate repair OK if complex
- 5 or more days—complications more likely
  - Stent or nephrostomy
  - Drain urinoma
  - Delayed reconstruction

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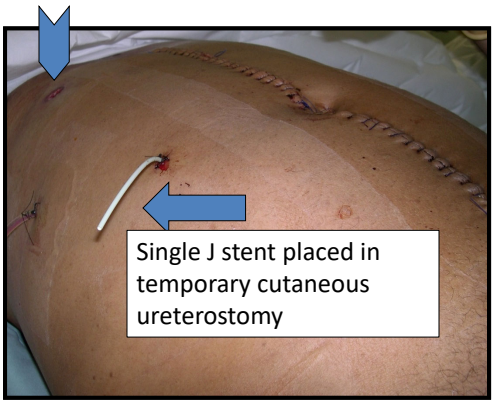
Ureteral Injury: Damage Control

- Single J stent diversion (distal suture)
- Ligation + PCN, delayed reconstruction



J Urol 2005;173:1202-1205

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PCN for Ureteral Injury

11b. Surgeons should perform percutaneous nephrostomy with delayed repair as needed in patients when stent placement is unsuccessful or not possible. **(Recommendation; Evidence Strength: Grade C)**

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Ureteral Fistulae: T or F?

Ureteral fistulae (ureterovaginal and uretero-uterine) often close spontaneously after stent placement alone.

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Ureteral Fistulae:

True

Ureteral fistula (ureterovaginal and uretero-uterine) often close spontaneously after stent placement alone.

(now in Updated 2020 AUA Guidelines as well – Guideline 11c)

Br J Urol 1993:65:453

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Principles of Ureteral Repair

- Debride non-viable tissue
- Wide spatulation
- Tension-free
- Watertight closure
- Stent
- Peri-ureteral drainage (+/-)

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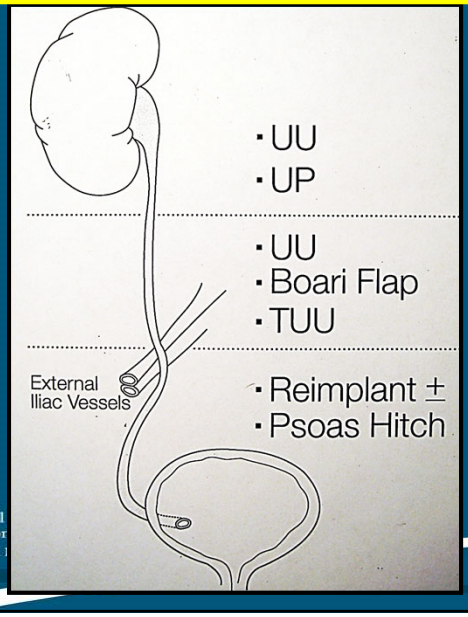
Involved Ureteral Segments



Repair Type by Injury Location

TUU usually a exam distractor; Not the answer

Following slides represent index cases with examples

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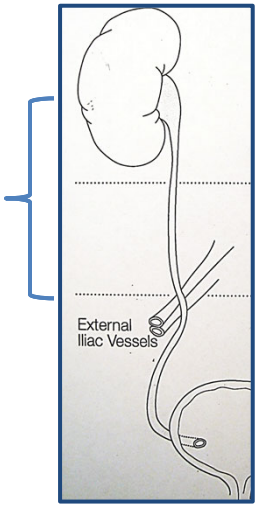
Ureteral

12a. "…Repair ureteral injuries located <u>proximal</u> to the iliac vessels with <u>primary repair</u> [U-U] over a ureteral stent, when possible".

(Recommendation; Evidence Strength: Grade C)



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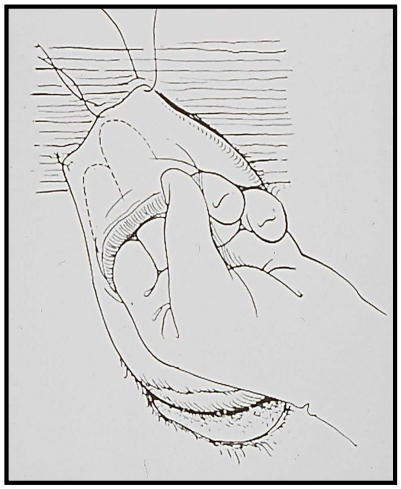
Ureteral Reconstruction Cases



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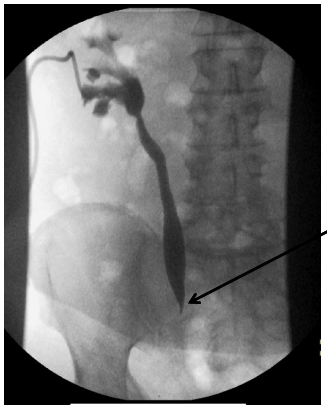
Psoas Hitch

58 y/o male, history of right mid-distal stricture after history of multiple stone related endoscopic procedures



Note antegrade contrast administration terminates at the level of the iliac vessels

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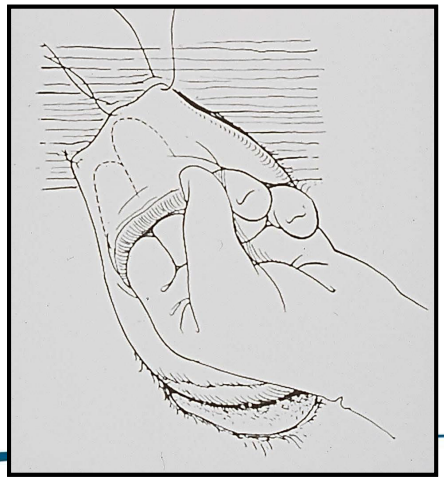
Psoas Hitch Ureteroneocystostomy

- Highly reliable: 85+% long-term success
  - Hence why distal uretero-ureterostomy doesn't make much sense
- Iatrogenic, traumatic inj
- Caution
  - **Genitofemoral nerve**
  - **Femoral nerve (deep)**



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Pearls of Psoas Hitch Reimplant

- Mobilize contralateral superior bladder
- Hitch bladder prior to reimplantation-- straight ureteral tunnel with 2 to 4 sutures (absorbable)
- Refluxing, spatulated anastomosis, stent

Marshall, J Urol, 1997

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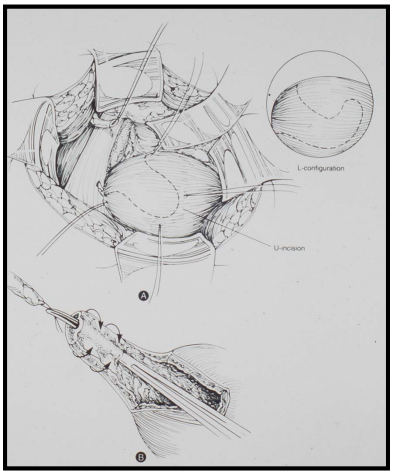
Boari Flap Reimplant

- Lower 2/3 (L4-5)
- May compromise bladder volume
- **MUST PERFORM HITCH**
- Not too narrow (flap necrosis)
- Planned, delayed repair best



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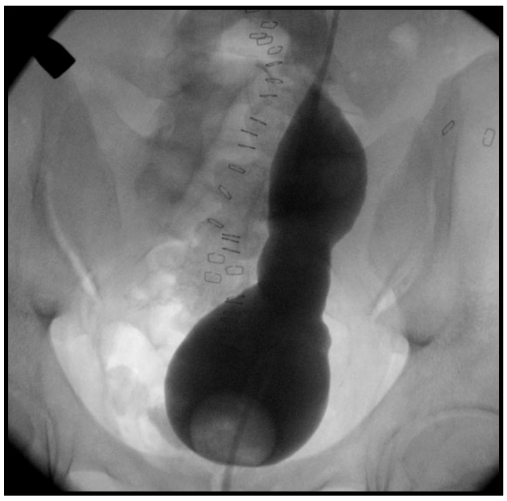
How High Can a Boari Go?

Prior to extensive mobilization of bladder and Boari reconstruction, adequate capacity (>300 cc) should be ensured and patients ought to be counseled on possible change in voiding patterns



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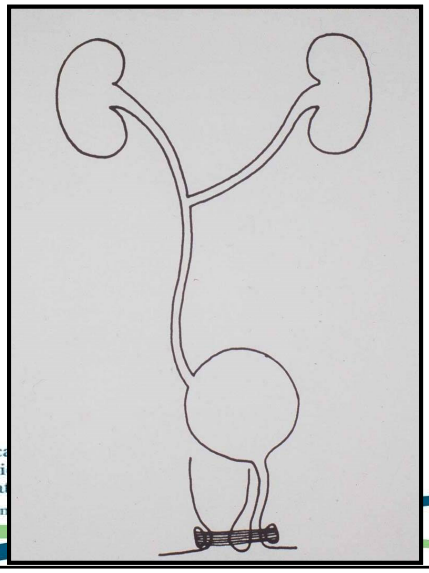
Transureteroureterostomy



- 96% effective in 25 yr Mayo experience (n=63)
- Complications higher for malignant (47%) vs benign (11%), p=0.04
- Above IMA
- End-to-side over stent
- Yo-yo effect→hydro

Iwaszko MR et al. J Urol, 2010.

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Transureterosureterostomy

Indications:

- Planned, Delayed
- Bladder small, fibrotic, pelvic abscess
- Extensive lower ureteral defect

Contraindications:

- Pelvic radiation
- Reflux
- Stone disease
- Cancer, TB, RPF

OFTEN UTILIZED AS A DISTRACTOR ON EXAMINATIONS!

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Retroperitoneal Fibrosis

- Note medial deviation. Etiology: “peri-aortitis”
- Steroids often first line
- Many “graduate” to ureterolysis – often require omental wrapping

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30F with a History of Failed Robotic Pyeloplasty x2

What about Buccal Graft Ureteroplasty for this (or another situation)?

Answer: Not enough long term data to support this as a ”standard of care” treatment in a testing environment

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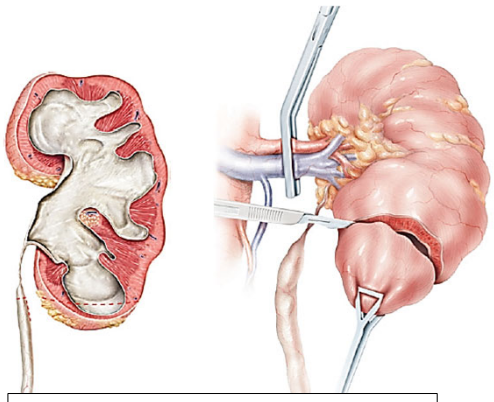
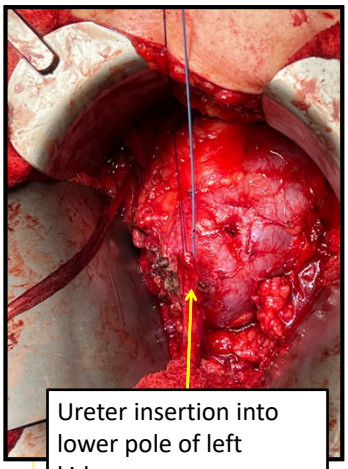
Ureterocalycostomy



Buzz word on examinations: "*Cortical thinning*"



Ureter insertion into lower pole of left kidney

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42y/o female. Ureteral avulsion following ureteroscopy

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Use of Ileum as Ureteral Replacement in Urological Reconstruction

Vol. 181, 177-181, January 2009
THE JOURNAL OF UROLOGY®

Sandra A. Armatys, Matthew J. Mellon, Stephen D. W. Beck, Michael O. Koch, Richard S. Foster and Richard Bihrle*

From the Department of Urology, Indiana University School of Medicine, Indianapolis, Indiana

- 80+% successful
- Contraindicated if renal compromise
- Risks: infection, mucus, fistula, stone
- Consider: autotransplant, nephrectomy, appendix

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Ureteroscopic Perforations

13a. "..Manage endoscopic ureteral injuries with a ureteral stent and/or percutaneous nephrostomy tube, when possible".

(Recommendation; Evidence Strength: Grade C)

13b. "…Manage endoscopic ureteral injuries with open repair when endoscopic or percutaneous procedures are not possible or fail to adequately divert the urine".

(Expert Opinion)

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Lower Abdominal Trauma

Man's lawsuit claims stripper ruptured his bladder

BY MICHELLE CASTILLO
OCTOBER 4, 2012 / 5:18 PM / CBS NEWS

A man is suing a strip club after one of the strippers allegedly ruptured his bladder when she slid down the stripper pole, the Philadelphia Inquirer reported.

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Accessed April 2022

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Lower Abdominal Trauma

- 34 y/o no significant PMH
- Bar fight 2 days ago. “Kicked multiple times”
- Presents to ER with abd. pain, low urine output and gross hematuria
- PE
  - Diffuse abdominal tenderness, worse in SP area
  - UA - Gross hematuria
  - BMP - Na 149, K 5.6, CO2 17, BUN 35

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Bladder

14b. " Perform retrograde cystography in stable patients with gross hematuria and a mechanism concerning for bladder injury, or in those with pelvic ring fractures and clinical indicators of bladder rupture".

(Recommendation; Evidence Strength: Grade C)

- Retrograde Fill to 350ml or till capacity
- Clamping Foley during CT Scan is not adequate

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CT ABD PELVIS - NONCON

RETROGRADE BLADDER CONTRAST

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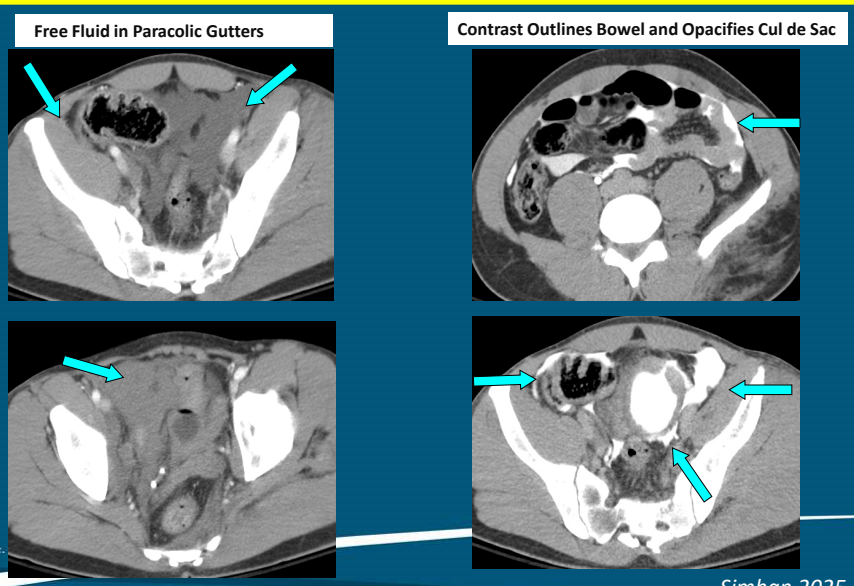
Intraperitoneal Bladder Injury



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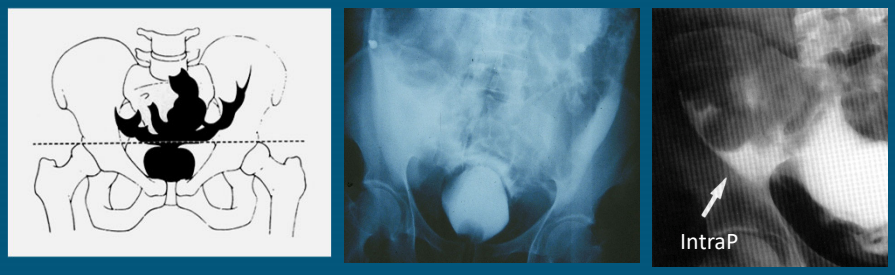
Plain Film Cystography: IntraP Injury



<u>Intraperitoneal Contrast</u>

- Outlines loops of bowel
- Fills Cul-de-Sac (Pouch of Douglas)
- Fills Paracolic Gutters
- Usually <u>Above</u> Superior Acetabular Line

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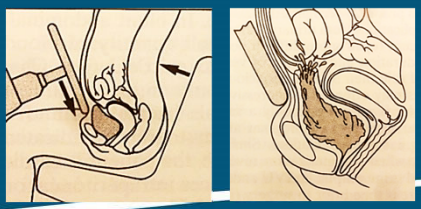
Bladder

15.” Surgeons must perform surgical repair of intraperitoneal bladder rupture in the setting of blunt or penetrating external trauma”.

(Standard; Evidence Strength: Grade B)

- Blunt bladder injuries to the dome – mean 6 cm



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Bladder

18. “Clinicians should perform urethral catheter drainage **without suprapubic** (SP) cystostomy in patients following surgical repair of bladder injuries.

(Standard; Evidence Strength: Grade B)

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Pelvic Fracture Case

- 36 yo , no PMH
- MVA – restrained driver
- Pelvic and leg pain
- X-rays – Pelvic FX
- X-rays – R femur FX
- Foley placed easily – gross hematuria

Note if Foley did not go in easily – then the concern is a pelvic fracture urethral injury – more on that later…

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Indications for Imaging?

Much higher chance of bladder injury with gross hematuria than microheme… but the rate is not 100%

- Pelvic Fracture + Gross Hematuria
  - –82/285 (29%)
- Pelvic Fracture + Microhematuria
  - –3/503 (0.6%)

J Trauma 2001:51;683

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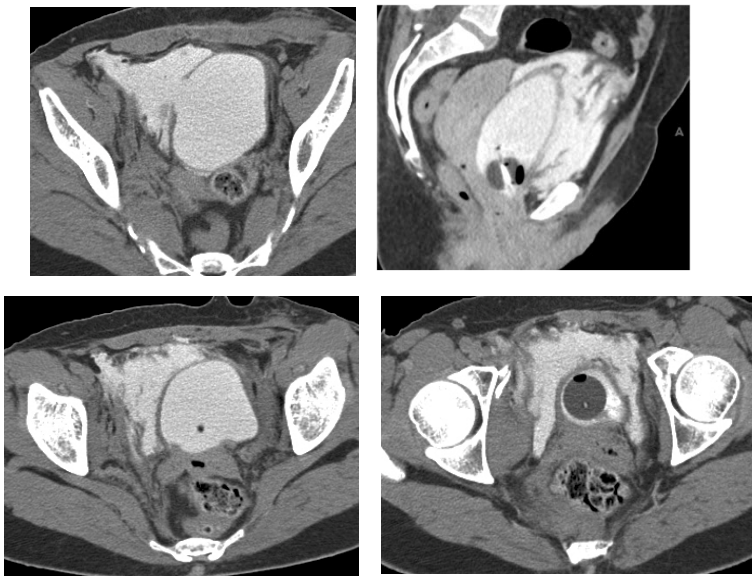
CT Cystogram



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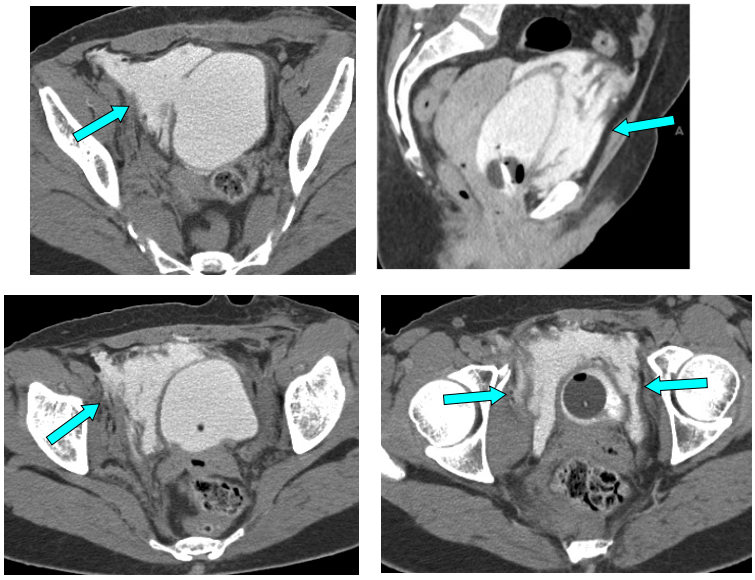
Extraperitoneal Injury



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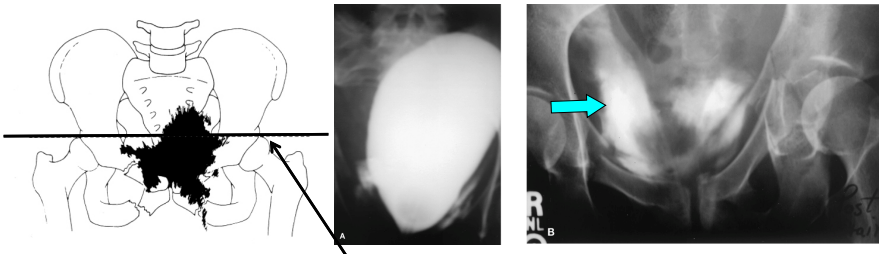
Plain Film Cystogram: ExtraP Injury



Extravasation on delayed films

– Flame-Like
– Star-Burst
– Usually Below Superior Acetabular Line

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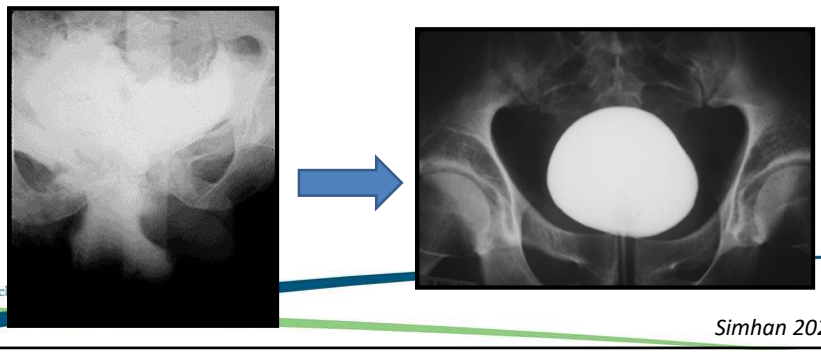
Extraperitoneal Bladder Rupture

16. Catheter drainage as treatment for patients with ***uncomplicated*** extraperitoneal bladder injuries. **(Recommendation; Evidence Strength: Grade C)**



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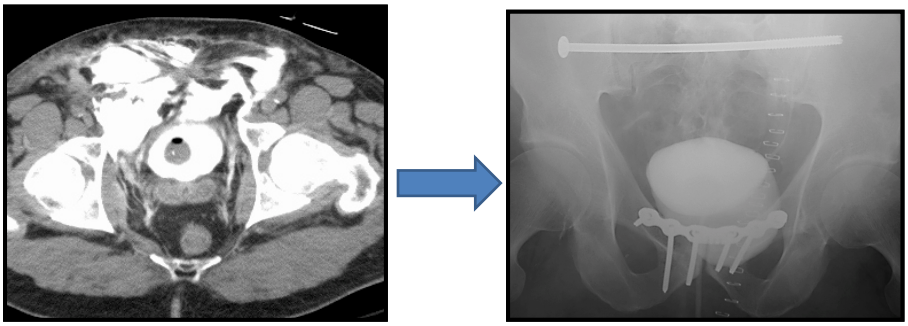
Complicated Bladder Trauma

17. **Should** perform surgical repair in patients with complicated extraperitoneal bladder injury.
(Recommendation; Evidence Strength: Grade C)



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Current Management of Extraperitoneal Bladder Injuries: Results from the Multi-Institutional Genito-Urinary Trauma Study (MiGUTS)

Ross E. Anderson, Sorena Keihani,* Rachel A. Moses, Alexander P. Nocera, J. Patrick Selph, Clara M. Castillejo Becerra, Nima Baradaran, Katie Glavin, Joshua A. Broghammer, Chirag S. Arya, Rachel L. Sensenig, Michael E. Rezaee, Bradley J. Morris, Sarah Majercik, Timothy Hewitt, Frank N. Burks, Ian Schwartz, Sean P. Elliott, Xian Luo-Owen, Kaushik Mukherjee, Peter B. Thomsen, Bradley A. Erickson, Brandi D. Miller, Richard A. Santucci, LaDonna Allen, Scott Norwood, Cameron N. Fick, Brian P. Smith, Joshua Piotrowski, Christopher M. Dodgion, Erik S. DeSoucy, Scott Zakaluzny, Dennis Y. Kim, Benjamin N. Breyer, Barbara U. Okafor, Reza Askari, Jacob W. Lucas, Jay Simhan, Seyyed Saeed Khabiri, Raminder Nirula and Jeremy B. Myers in conjunction with the Trauma and Urologic Reconstruction Network of Surgeons

From the Division of Urology (REA, SK, JBM), Department of Surgery, University of Utah, Salt Lake City, Utah, Department of Surgery (RAM, MER), Section of Urology, Dartmouth Hitchcock Medical Center, Lebanon, New Hampshire, Department of Urology (APN, JPS), University of Alabama at Birmingham, Birmingham, Alabama, Department of Urology (CMCB, NB), The Ohio State University Wexner Medical Center, Columbus, Ohio, University of Kansas Medical Center (KG, JAB), Kansas City, Kansas, Division of Trauma (CSA, RLS), Department of Surgery, Cooper University Hospital, Camden, New Jersey, Division of Trauma and Surgical Critical Care (BJM, SM), Intermountain Medical Center, Murray, Utah, Department of Urology (TH, FNB), Oakland University William Beaumont School of Medicine, Royal Oak, Michigan, Department of Urology (IS, SPE), Hennepin County Medical Center, University of Minnesota, Minneapolis, Minnesota, Division of Acute Care Surgery (XL-O, KM), Loma Linda University Medical Center, Loma Linda, California, Department of Urology (PBT, BAE), University of Iowa, Iowa City, Iowa, Department of Urology (BDM, RAS), Detroit Medical Center, Detroit, Michigan, Department of Surgery (LA, SN), UT Health Tyler, Tyler, Texas, Division of Trauma and Surgical Critical Care (CNF, BPS), Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania, Department of Urology (JP, CMD), Medical College of Wisconsin, Milwaukee, Wisconsin, Department of Surgery (ESD, SZ), University of California Davis Medical Center, Sacramento, California, Division of Trauma/Acute Care Surgery/Surgical Critical Care (DYK), Harbor-UCLA Medical Center, California, Department of Urology (BNB), University of California—San Francisco, San Francisco, California, Division of Trauma (BUO, RA), Department of Surgery, Brigham and Women's Hospital, Boston, Massachusetts, Department of Urology (JWL, JS), Einstein Healthcare Network, Philadelphia, Pennsylvania, Department of Orthopedic Surgery (SSK), Kermanshah University of Medical Sciences, Kermanshah, Iran, and Department of Surgery (RN), University of Utah, Salt Lake City, Utah

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www.auajournals.org/journal/juro

Abbreviations and Acronyms
CD = catheter drainage
CT = computerized tomography
EBI = extraperitoneal bladder injury
ISS = injury severity score
NTDB = National Trauma Data Bank

Purpose: We studied the current management trends for extraperitoneal bladder injuries and evaluated the use of operative repair versus catheter drainage, and the associated complications with each approach.

Materials and Methods: We prospectively collected data on bladder trauma from 20 level 1 trauma centers across the United States from 2013 to 2018. We excluded patients with intraperitoneal bladder injury and those who died within 24 hours of hospital arrival. We separated patients with extraperitoneal bladder injuries into 2 groups (catheter drainage vs operative repair) based on their initial management within the first 4 days and compared the rates of bladder injury related complications among them. Regression analyses were used to

0022-5347/20/2043-0538/0
THE JOURNAL OF UROLOGY®
https://doi.org/10.1097/JU.0000000000001075
Vol. 204, 538-544, September 2020

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The Role of Surgery in the Management of Complex Extraperitoneal Bladder Injury

Jacob W. Lucas[1] · Andrew Chen[1] · Jay Simhan[1,2,3]

- Vaginal laceration
- Bladder neck injury
- Persistent gross hematuria w clots
- Concomitant rectal injury
- Bone fragment/foreign body in bladder (e.g. from pelvis) – rare
- Undergoing exploration for another injury (orthopedic or abdominal)

Lucas and Simhan, Curr Trauma, 2017

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Foley Alone After Bladder Repair

No SPT Required – by Guidelines!

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Extraperitoneal Injury

Urotrauma: AUA Guideline

Allen F. Morey, Steve Brandes, Daniel David Dugi III, John H. Armstrong, Benjamin N. Breyer, Joshua A. Broghammer, Bradley A. Erickson, Jeff Holzbeierlein, Steven J. Hudak, Jeffrey H. Pruitt, James T. Reston, Richard A. Santucci, Thomas G. Smith III and Hunter Wessells

0022-5347/14/1922-0327/0 http://dx.doi.org/10.1016/j.juro.2014.05.004
THE JOURNAL OF UROLOGY® Vol. 192, 327-335, August 2014

Intraperitoneal Injury

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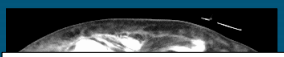
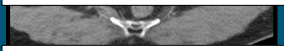
Extraperitoneal Injury




"Complex" Extraperitoneal




Iatrogenic Injury

Intraperitoneal Injury

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- 46 yo
- Penis slipped out vagina during intercourse
- Immediate pain and penis swelling
- Immediate detumescence
- Presents to ER 6 hrs after injury at 2 AM

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Genital

26. Clinicians **must** suspect penile fracture when a patient presents with penile ecchymosis, swelling, cracking or snapping sound during intercourse or manipulation and immediate detumescence.
(Standard; Evidence Strength: Grade B)

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However, what if...

- Penis slipped out vagina during intercourse
- "Mild" pain
- "Mild" bruising
- "Unsure if rapid detumescence"

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Penis

28. "Clinicians may perform ultrasound in patients with equivocal signs and symptoms of penile fracture". **(Expert Opinion)**

- US – most commonly used and wide availability
- MR for equivocal US
- Equivocal imaging → Exploration

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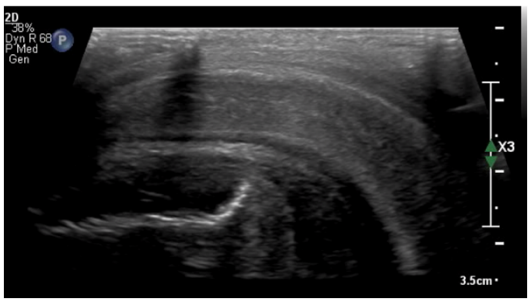
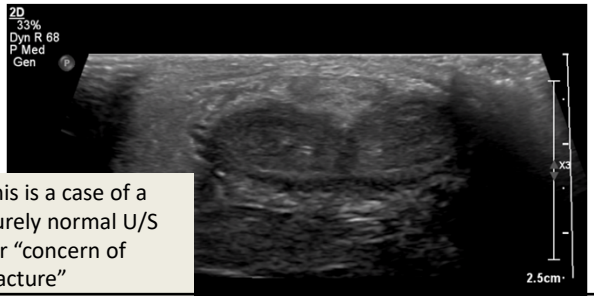
Ultrasound





This is a case of a purely normal U/S for "concern of fracture"

Penile exam several weeks after U/S – completely normal

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Coming back to this case…

How is the urethra evaluated?

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Penile Fracture and Urethral Injury

29. "Clinicians must perform evaluation for concomitant urethral injury in patients with penile fracture or penetrating trauma who present with:

- blood at the urethral meatus
- gross hematuria
- inability to void.

(Standard; Evidence Strength: Grade B)

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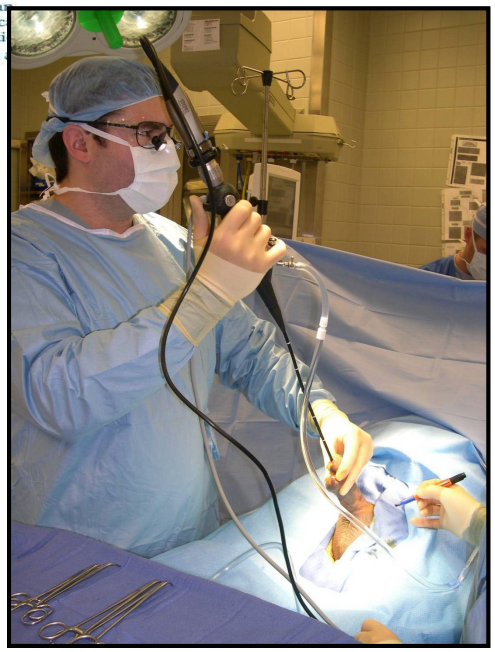

- Cystoscopy is one way to perform an "on table" OR evaluation
- Other ways include a Retrograde Urethrogram either preop or intraop

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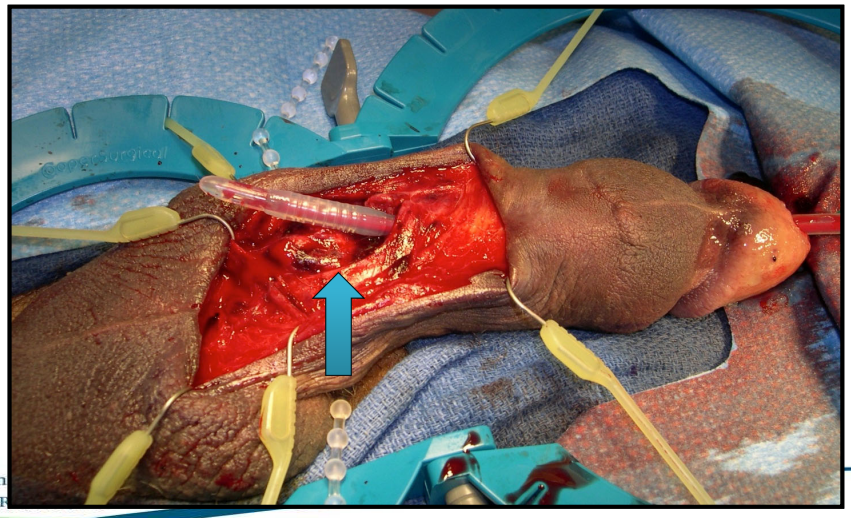
Complete Urethral Rupture & Fracture of Both Corpora



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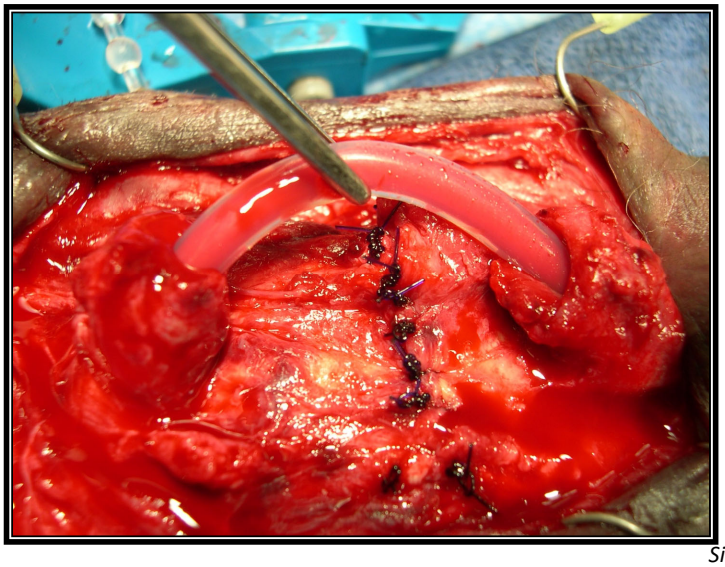
Corpora Repaired



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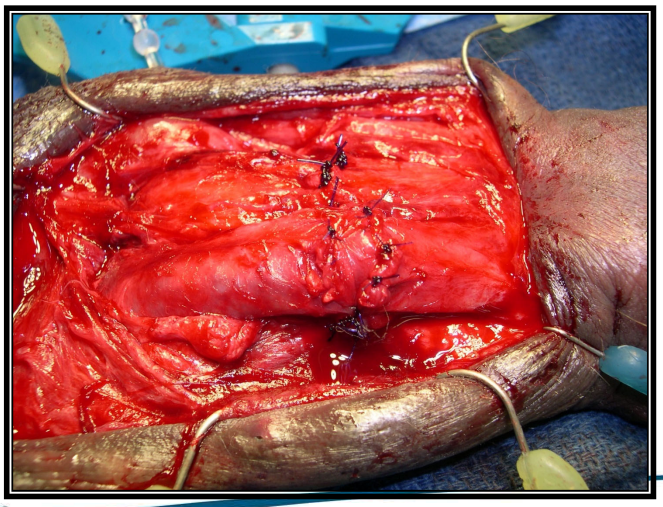
Urethra Mobilized & Repaired



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Genital

27. “Surgeons should perform <u>prompt</u> surgical exploration and repair in patients with acute signs and symptoms of penile fracture”. **(Standard; Evidence Strength: Grade B)**

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Male Sexual Dysfunction

UROLOGY 77 (6), 2011

Does Timing of Presentation of Penile Fracture Affect Outcome of Surgical Intervention?

Ahmed El-Assmy, Hossam S. El-Tholoth, Tarek Mohsen, and El Housseiny I. Ibrahiem

- 180 patients: 1986-2010
- Divided into two study groups
  - Group I: **"Early"** presentation, <24 hours
    - F/u 105 months
  - Group II: **"Delayed"** presentation, >24 hours
    - F/u 113 months

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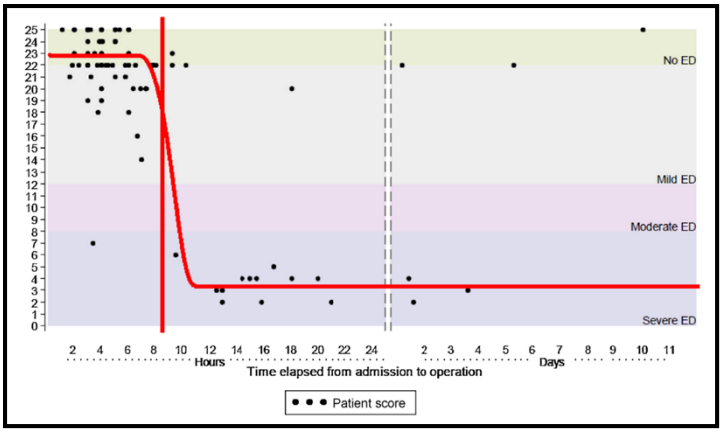
Delaying Surgical Treatment of Penile Fracture Results in Poor Functional Outcomes: Results from a Large Retrospective Multicenter European Study

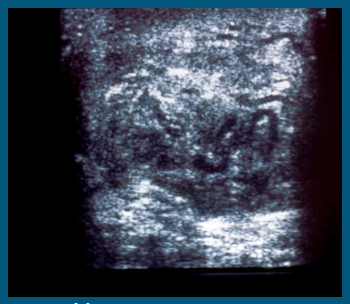
Giorgio Bozzini [a], Maarten Albersen [b], Javier Romero Otero [c], Markus Margreiter [d], Eduard Garcia Cruz [e], Alexander Mueller [f], Christian Gratzke [g], Ege Can Serefoglu [h], Juan Ignacio Martinez Salamanca [i], Paolo Verze [j,], on behalf of the European Association of Urology Young Academic Urologists Men's Health working party*

EUROPEAN UROLOGY FOCUS XXX (2016)

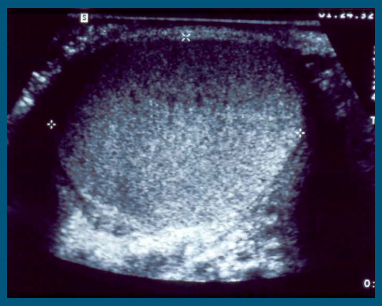


102

Ultrasound Echo Pattern – Blunt Injury Eval



Heterogeneous echo pattern – Suggests rupture



Normal homogenous contralateral testis

Buckley and McAninch, J Urol, 2006

<u>Proceed to OR</u>

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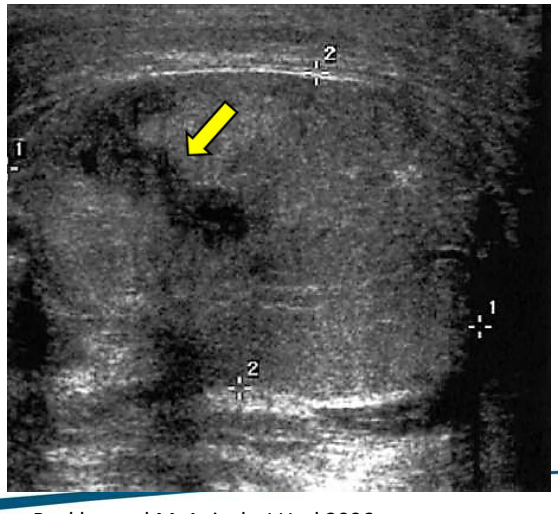
Scrotal Ultrasound for Blunt Testis Trauma



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Buckley and McAninch, J Urol 2006

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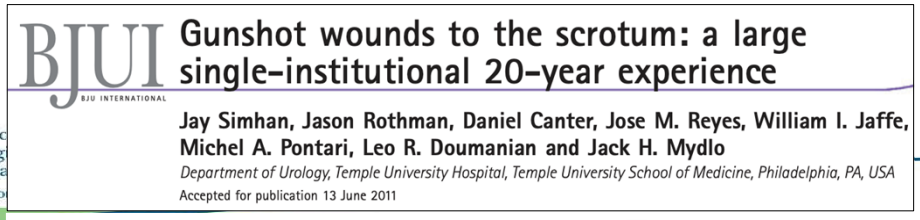
GSW Scrotum

- Physical Exam often unreliable with penetrating scrotal injuries
- Scrotal GSW that penetrate the Dartos or present with scrotal swelling should be explored.



BJUI
BJU INTERNATIONAL

Gunshot wounds to the scrotum: a large single-institutional 20-year experience

Jay Simhan, Jason Rothman, Daniel Canter, Jose M. Reyes, William I. Jaffe, Michel A. Pontari, Leo R. Doumanian and Jack H. Mydlo

Department of Urology, Temple University Hospital, Temple University School of Medicine, Philadelphia, PA, USA

Accepted for publication 13 June 2011

BJU INTERNATIONAL © 2011 BJU INTERNATIONAL | 109, 1704–1708 | doi:10.1111/j.1464-410X.2011.10631.10723.x

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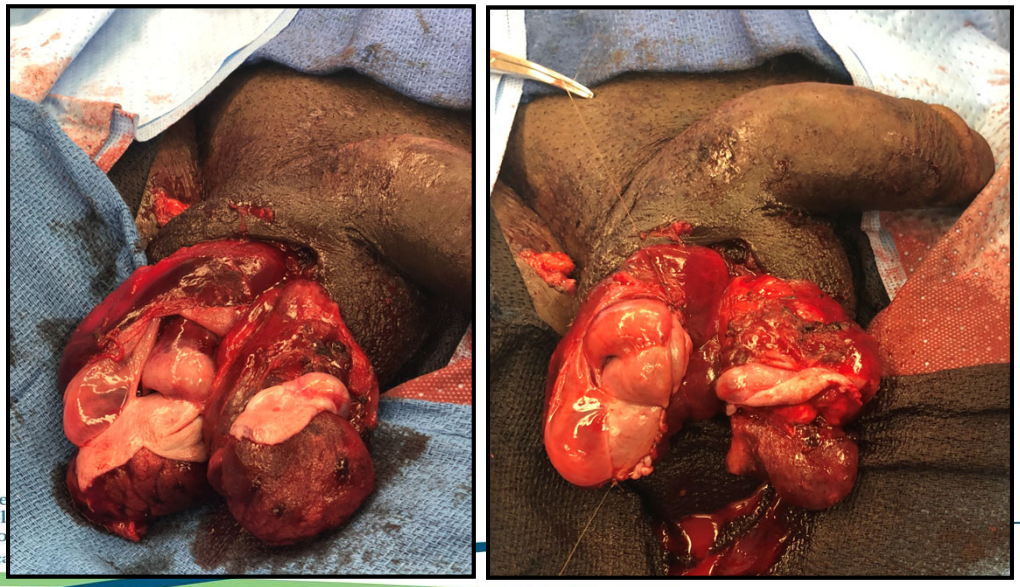
Explore Both Testicles!



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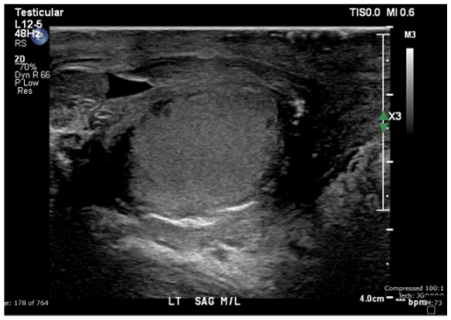
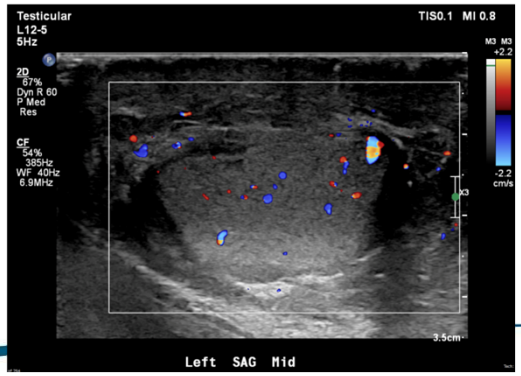
Ultrasound at 3 months





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Urethral Trauma/Stricture Management

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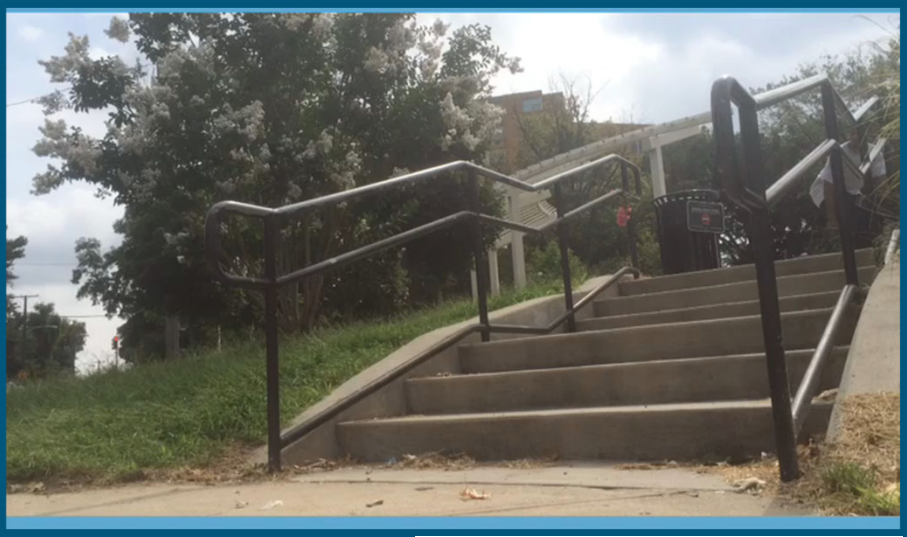

Posted with permission from my personal patient

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How Do We Decide on Management? (*Simplified*)

- Patient factors (h/o prior DVIU, etc)
- Etiology (Trauma vs. Iatrogenic vs. Inflammatory vs. etc.)
- Location (Fossa vs. Penile vs. Bulbar vs. Membranous)

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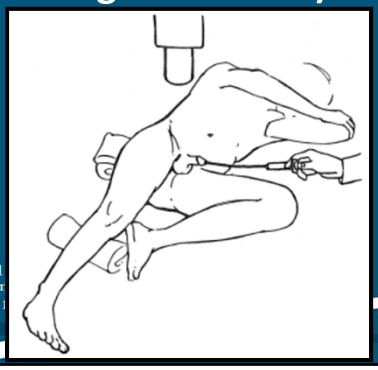
Urethral Trauma Imaging

19. **Should** perform retrograde urethrography in patients with blood at the urethral meatus after pelvic trauma. **(Recommendation; Evidence Strength: Grade C)**



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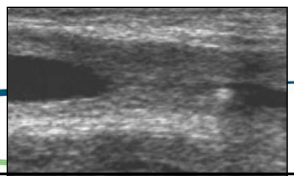
Urethral Stricture Imaging

3. **Should** use Cystoscopy, RUG, VCUG, or Ultrasound to make a diagnosis of urethral stricture **(Moderate Recommendation; Evidence Strength: Grade C)**

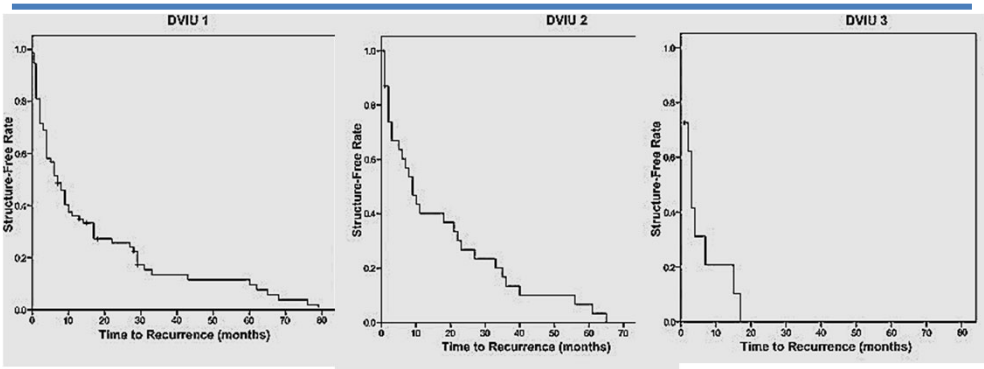
Of note, ~~Ultrasound better at detecting stricture length than~~ RUG/VCUG (probably better for operative planning)*

*Morey and McAninch, J Urol, 1998.



112

Urethrotomy is Futile



Characteristic study demonstrating more DVIUs results in poorer long term urethral patency.

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*Santucci et al: Urethrotomy Has a Much Lower Success Rate Than Previously Reported . J Urol **183:** 1859-1862, **2010***

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Urethrotomy: Complications

Quint , Stanisic (1993)	Hemorrhage	[illegible]
Giannakopolous et al (1997)	Perineal hema[illegible]	20%
Giannkopolous et al (1997)	Scrotal [illegible]	13.4%
Boccon-Gibod, Le Portz (1982)	[illegible]ge	10%
Quint , Stanisic (1993)	[illegible]tal perforation	10%
Giannakopolous et al [illegible]	Epididymo-orchitis	8.8%
Giannakopolo[illegible]7)	Meatal stenosis	8.8%
Shawl[illegible]	Urinary incontinence	8.7%
[illegible]us (1979)	Fever	3.6%

Historic Data – but Urethrotomy is **NOT** benign!

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Dilation = DVIU ≠ Urethroplasty

11a. Should **offer urethroplasty** instead of repeated endoscopic management for recurrent anterior urethral strictures following failed dilation or DVIU **(Moderate Recommendation; Evidence Strength: Grade C).**

Note 11b – drug coated balloons also OK if recurrent bulbar and <3 cm.

16. Should **offer urethroplasty** as **initial treatment** with long (≥2 cm) bulbar strictures **(Moderate Recommendation; Evidence Strength: Grade C)**

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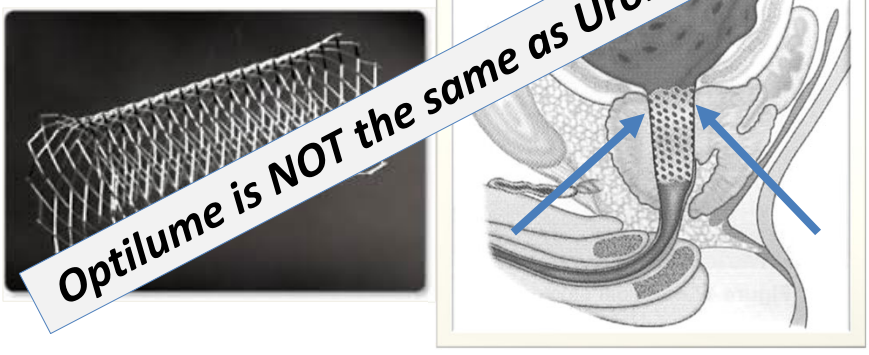
What is Optilume?



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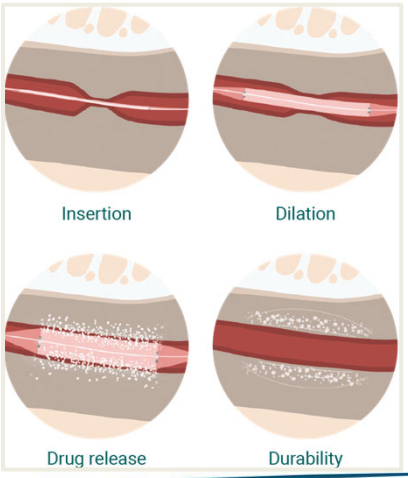
What is Optilume?

Optilume is a drug coated balloon that is used during urethral dilation

Optilume dilation is suggested following an initial standard dilation in same setting



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One-Year Results for the ROBUST III Randomized Controlled Trial Evaluating the Optilume® Drug-Coated Balloon for Anterior Urethral Strictures

Sean P. Elliott,[1,*] Karl Coutinho,[2] Kaiser J. Robertson,[3] Richard D'Anna,[4] Kent Chevli,[5] Serge Carrier,[6] Melanie Aube-Peterkin,[6] Christopher H. Cantrill,[7] Michael J. Ehlert,[8] Alexis E. [9] Jeffrey Dann,[10] Jessica M. DeLong,[11] Steven B. Brandes,[12] Judith C. Hagedorn,[13] Richard Lev Amy Schlaifer,[15] Euclid DeSouza,[16] David DiMarco,[17] Brad A. Erickson,[18] Richard Natale,[19] Douglas A. Husmann,[20] Allen Morey,[21] Carl Olsson[22] and Ramón Virasoro[11]

THE JOURNAL of UROLOGY®
www.auajournals.org/journal/juro

Purpose: The Optilume® drug-coated balloon (DCB) is a urethral dilation balloon with a paclitaxel coating that combines mechanical dilation for immediate symptomatic relief with local drug delivery to maintain urethral patency. The ROBUST III study is a randomized, single-blind trial evaluating the safety and efficacy of the Optilume DCB against endoscopic management of recurrent anterior urethral strictures.

Materials and Methods: Eligible patients were adult males with anterior strictures ≤12Fr in diameter and ≤3 cm in length, at least 2 prior endoscopic treatments, International Prostate Symptom Score ≥11 and maximum flow rate <15 ml per second. A total of 127 subjects were enrolled at 22 sites. The primary

Table 2. *Primary efficacy end point results*

End Point	Standard of Care	Optilume DCB	Difference* (95% CI)	p Value*
No. pts	48	79		
% Stricture-free (No./ total No.)	26.8 (11/41)	74.6 (50/67)	44.4 (27.6–61.1)	<0.0001
No. subject accountability:				
Pass urethral lumen test at 6 mos	11	50		
Failed urethral lumen test at 6 mos†	12	15		
Repeat intervention prior to 6 mos‡	18	2		
Missing cystoscopy at 6 mos	7	12		

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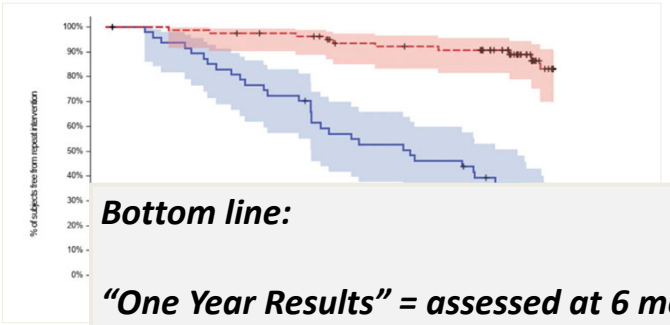

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Bottom line:

"One Year Results" = assessed at 6 months following treatment

Authors report DCB has 75% success rate against 25% standard dilation at 6 months

One-Year
Trial Evalu
Anterior U

Sean P. Elliott,[1,*] Karl Coutinho,[2] Kaiser J. Robertson,[3] Richard D'Anna,[4] Kent Chevli,[5] Serge Carrier,[6] Melanie Aube-Peterkin,[6] Christopher H. Cantrill,[7] Michael J. Ehlert,[8] Alexis E. Te,[9] Jeffrey Dann,[10] Jessica M. DeLong,[11] Steven B. Brandes,[12] Judith C. Hagedorn,[13] Richard Levin,[14] Amy Schlaifer,[15] Euclid DeSouza,[16] David DiMarco,[17] Brad A. Erickson,[18] Richard Natale,[19] Douglas A. Husmann,[20] Allen Morey,[21] Carl Olsson[22] and Ramón Virasoro[11]

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One-Year Results for the ROBUST III Randomized Controlled Trial Evaluating the Optilume® Drug-Coated Balloon for Anterior Urethral Strictures

THE JOURNAL of UROLOGY
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Sean P. Elliott,[1,*] Karl Coutinho,[2] Kaiser J. Robertson,[3] Richard D'Anna,[4] Kent Chevli,[5] Serge Carrier,[6] Melanie Aube-Peterkin,[6] Christopher H. Cantrill,[7] Michael J. Ehlert,[8] Alexis E. Te,[9] Jeffrey Dann,[10] Jessica M. DeLong,[11] Steven B. Brandes,[12] Judith C. Hagedorn,[13] Richard Levin,[14] Amy Schlaifer,[15] Euclid DeSouza,[16] David DiMarco,[17] Brad A. Erickson,[18] Richard Natale,[19] Douglas A. Husmann,[20] Allen Morey,[21] Carl Olsson[22] and Ramón Virasoro[11]

Study design:

- ***Surgeon not blinded to treatment***
- ***Optilume arm underwent "pre-dilation" and then most were dilated to 30F, whereas the control arm was dilated to discretion of the surgeon***
- ***Majority were very short bulbar urethral strictures***
- ***No complex patients: prior urethroplasty, radiation, hypospadias***

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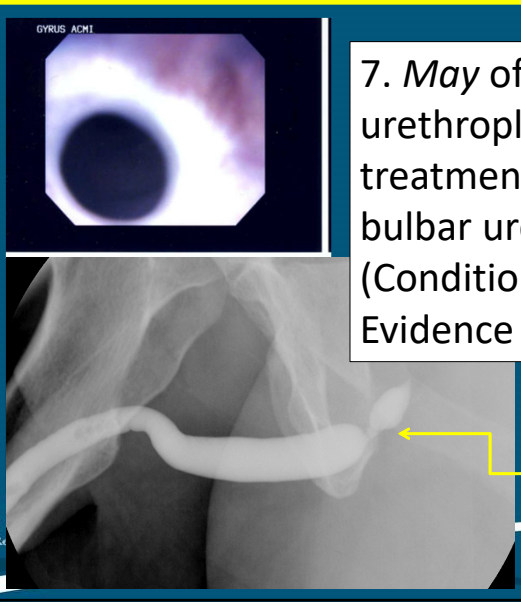
Who can get DVIU/Dilation then?



7. *May* offer dilation, DVIU or urethroplasty for initial treatment of short (<2 cm) bulbar urethral stricture (Conditional Recommendation; Evidence Grade C)

Short (1 cm) Bulbar urethral stricture

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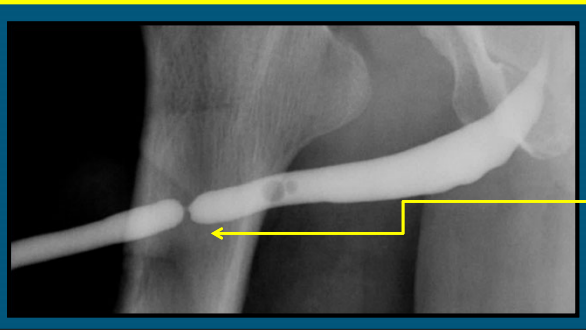
What about SHORT penile strictures?



Short (0.5 cm) Penile urethral stricture

15. Should **offer urethroplasty** to patients with penile strictures, given the expected high recurrence rates with endoscopic treatments. (Moderate Recommendation; Evidence Grade C)

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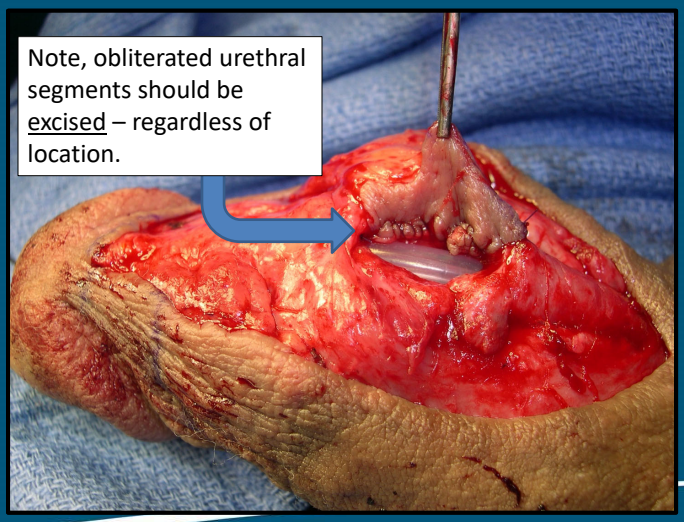
Dorsal Plate Excision + Penile Flap Onlay



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Urethral Anatomy

Vascular Anatomy of Genital Skin and the Urethra: Implications for Urethral Reconstruction

Steven B. Brandes

* Urethral Reconstructive Surgery: 2008

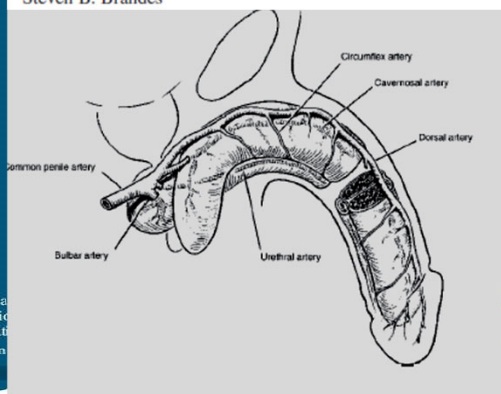

FIG. 2.7. Urethral and penile arterial blood supply. (From Jordan GH (ed) (1997) Reconstruction for urethral stricture, Atlas of Urol Clin of NA 5(1))

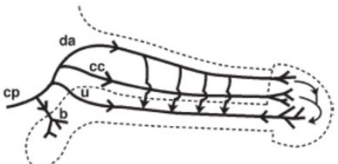

FIG. 2.8. Bipedal arterial blood supply of the urethra (cp, common penile; da, dorsal artery of the penis; cc, central cavernosal; u, urethral; b, bulbar artery)

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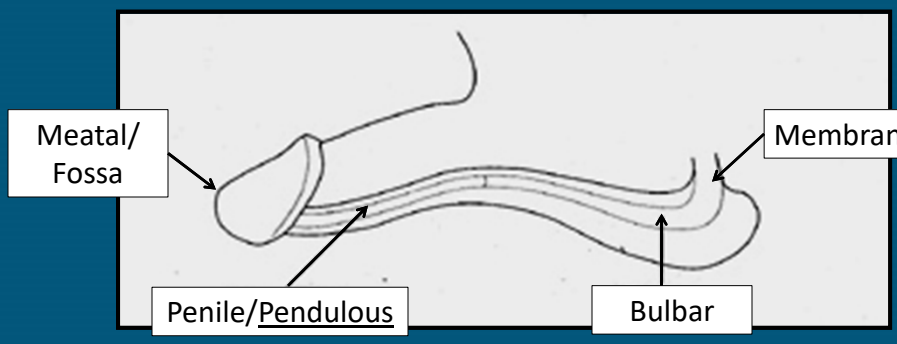
Urethral Anatomy Simplified



Surgical management varies based on location – will review basics here…

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Meatal/Fossa Strictures

- Often Lichen sclerosus (LS, formerly BXO) related
- Biopsy for LS/BXO mgmt to r/o penile SCC (AUA Stricture Guidelines, #30)
- Meatotomy / Dilation are acceptable first line management options (AUA stricture guideline, #13)
- Urethroplasty for recurrent meatal/fossa strictures (AUA stricture guideline, #14)

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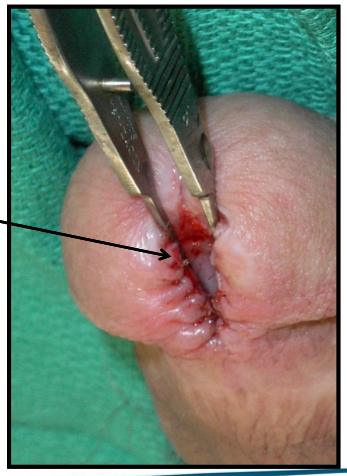
Lichen Sclerosus

Extended Meatotomy is an acceptable treatment for most LS patients (AUA guideline)

Most patients need topical steroidal ointment as well (Clobetasol 0.05% bid)



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Transurethral ventral buccal mucosa graft inlay for treatment of distal urethral strictures: international multi-institutional experience

Michael Daneshvar[1] · Jay Simhan[2] · Stephen Blakely[1] · Javier C. Angulo[3,4] · Jacob Lucas[2] · Craig Hunter[5] · Justin Chee[6] · Damian Lopez Alvarado[7] · Erick Alejandro Ramirez Perez[8] · Alosh Madala[9] · Juan José de Benito[10] · Francisco Martins[11] · João Felício[11] · Paul Rusilko[12] · Brian J. Flynn[13] · Dmitriy Nikolavsky[1]

World Journal of Urology (2020) 38:2601–2607
https://doi.org/10.1007/s00345-019-03061-6

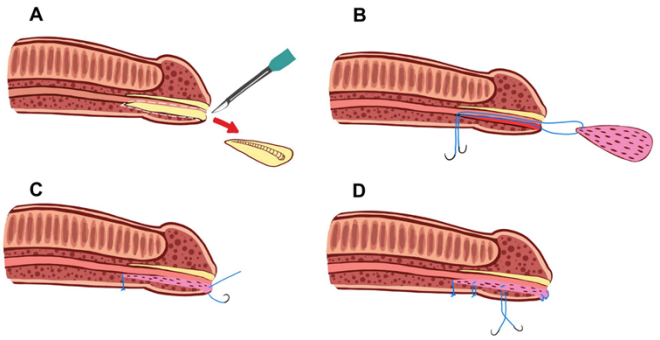

Fig. 1 Surgical steps **a** transurethral resection of a shallow wedge of the scar tissue ventrally and ventro-laterally. **b** Placement of a double-armed absorbable suture through the buccal graft and through the proximal apex of the urethrotomy (inside-out), **c** external apical suture tying, meatal BMG edge fixation and **d** inside-out quilting of the graft with additional absorbable double-arm sutures

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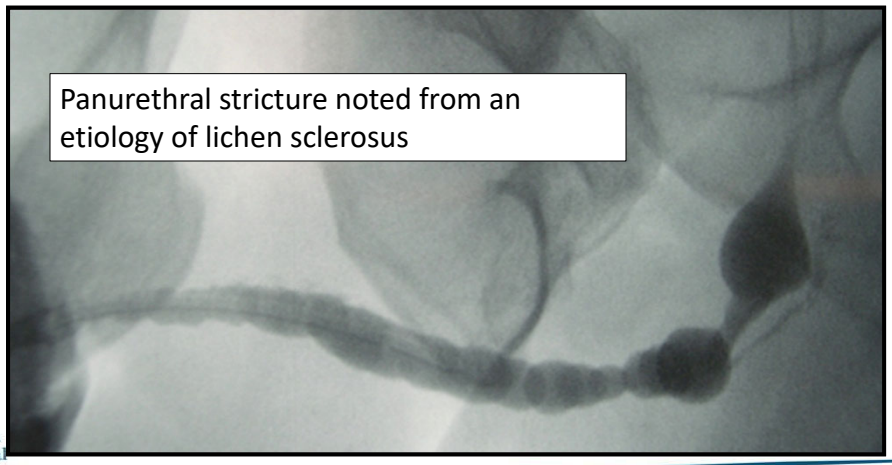
More extensive LS Case – Avoid Genital Skin!



Panurethral stricture noted from an etiology of lichen sclerosus

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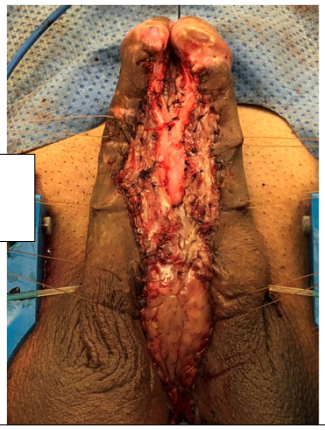
More extensive LS Case – Avoid Genital Skin!

1st stage – BMG Onlay



2nd stage – BMG Onlay

Two stage reconstruction is done with buccal mucosa graft harvest in advanced cases of LS – and is often done in reoperative hypospadias cases in adults. (Genital skin usage during urethroplasty is contraindicated for LS patients)

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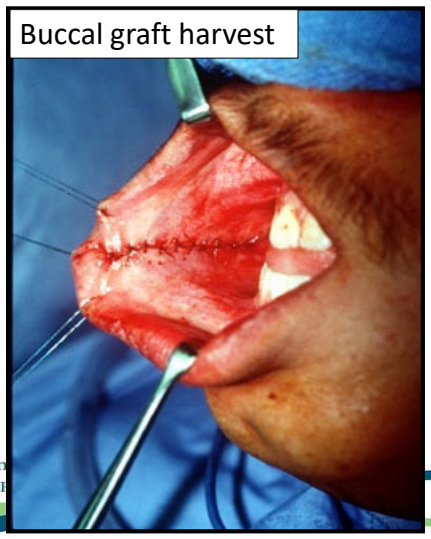
Penile Strictures Necessitate Grafts and/or Flaps



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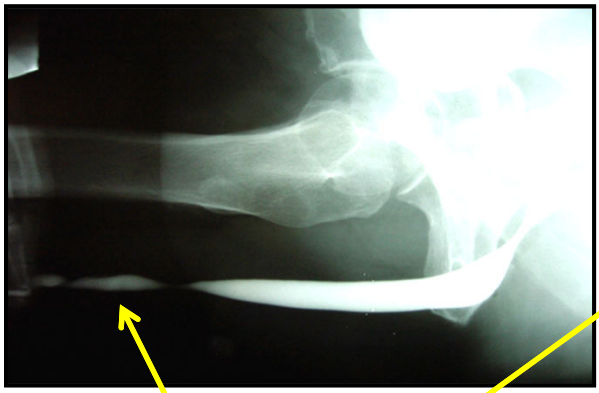
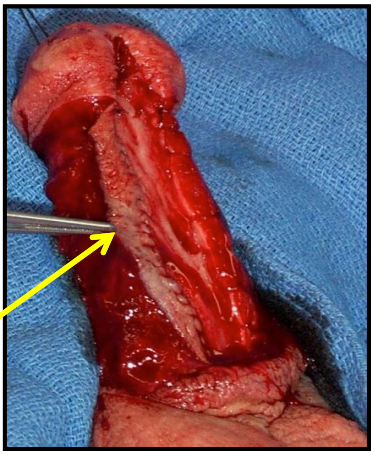
Penile Strictures Necessitate Grafts and/or Flaps





Penile stricture cases often require either penile skin flaps or buccal grafts – this case repaired with extended meatotomy and penile skin flap urethroplasty

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Assoc
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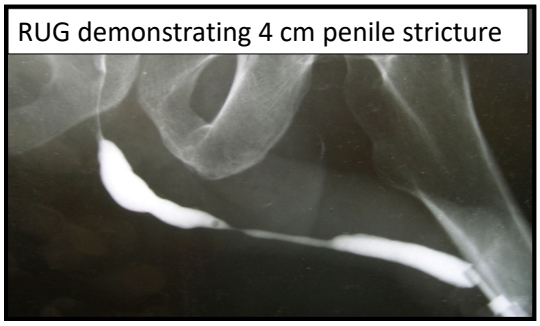
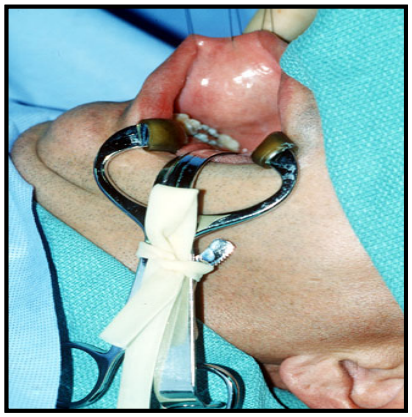
If Graft Performed, BMG should be first choice (AUA Guideline #19A); Lingual OK too (#19B)

RUG demonstrating 4 cm penile stricture





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Bulbar Urethral Strictures 25 Year Meta-Analysis: Excision and Primary Anastomosis

Series	n	Success rate (%)
16	1234	93.8

ICUD Consultation 2010 (Marrakech, Morocco)

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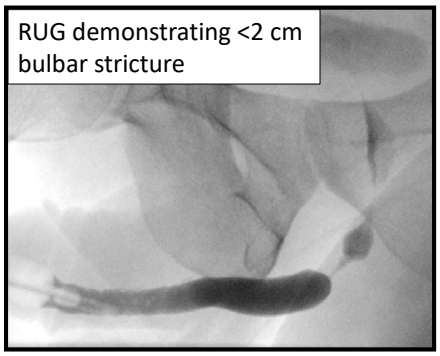
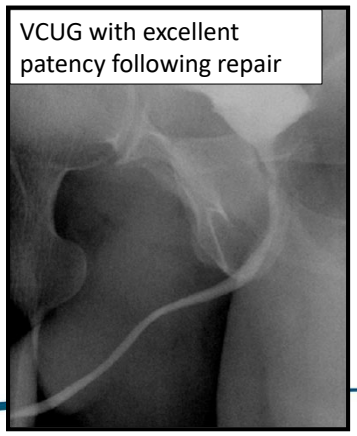
Bulbar Strictures (≤ 2 cm) can undergo Excision with Primary Anastomosis Safely

Pre-op



s/p EPA



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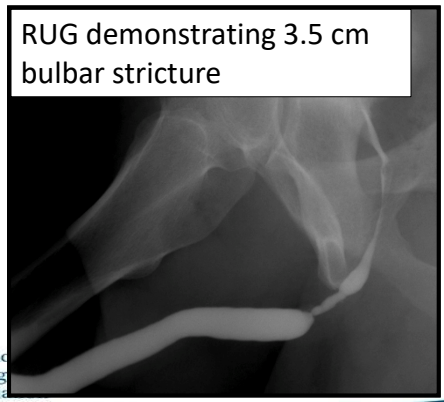
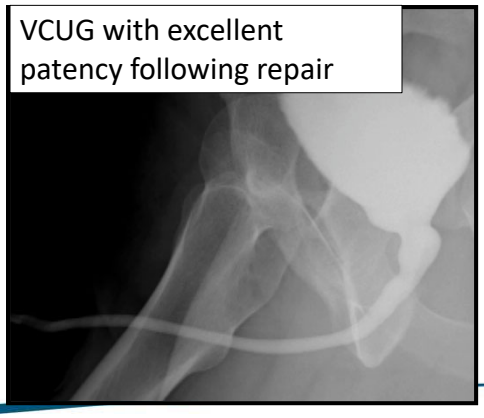
Bulbar Strictures (> 2 cm) should undergo substitution (e.g. graft and/or flap)

Pre-op



s/p Ventral BMG Repair



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Urethral Strictures – Summary

- Complete obliteration requires excision of segment (regardless of location)
- Penile strictures require grafts and/or flaps
- Bulbar strictures ≤2 cm consider EPA strongly ; >2 cm don't EPA
- Know when DVIU is acceptable – all other times, must consider urethroplasty

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Pelvic Fracture Urethral Injury (PFUI) "Controversial"

- Immediate primary repair? - NEVER
- Endoscopic realignment?
- Suprapubic tube + delayed reconstruction?

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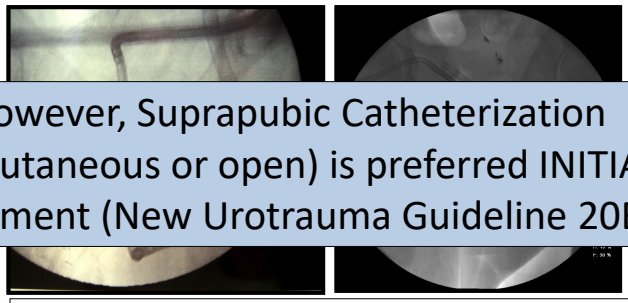
Urethral Trauma Management

22. May perform primary realignment (PR) in hemodynamically stable patients with pelvic fracture associated urethral injury. **(Option; Evidence Strength: Grade C)**



However, Suprapubic Catheterization (percutaneous or open) is preferred INITIAL treatment (New Urotrauma Guideline 20B)

should not perform prolonged attempts…

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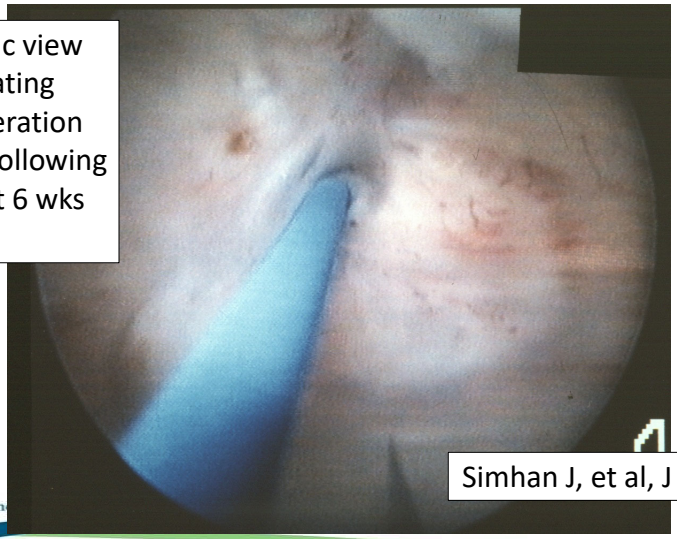
6 Wks After Realignment – Patients MUST be monitored for Development of Stricture

Cystoscopic view demonstrating near obliteration of lumen following realigment 6 wks prior



Simhan J, et al, J Urol 2014

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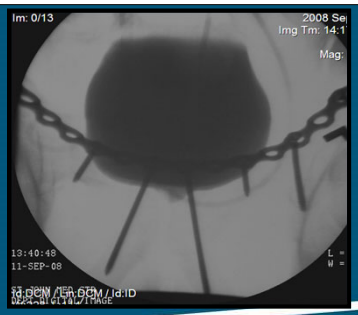
Pelvic Fracture Urethral Injury

May place SP in patients undergoing open reduction internal fixation (ORIF) for pelvic fracture. **(Expert Opinion)**



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A multicenter prospective cohort study of endoscopic urethral realignment versus suprapubic cystostomy after complete pelvic fracture urethral injury

Benjamin J. McCormick, MD, Sorena Keihani, MD, Judith Hagedorn, MD, MHS, J. Patrick Selph, MD, Bradley D. Figler, MD, Niels V. Johnsen, MD, MPH, Rodrigo Donalisio da Silva, MD, Joshua A. Broghammer, MD, Shubham Gupta, MD, Brandi Miller, DO, Frank N. Burks, MD, Jairam Eswara, MD, E. Charles Osterberg, III, MD, Kenneth J. Carney, MD, Bradley A. Erickson, MD, MS, Matthew B. Gretzer, MD, Paul H. Chung, MD, Catherine R. Harris, MD, Gregory P. Murphy, MD, Paul Rusilko, DO, Anand Shridharani, MD, Cooper Benson, MD, Amjad Alwaal, MD, Sarah D. Blaschko, MD, Benjamin N. Breyer, MD, MAS, Gregory M. Amend, MD, Maxim McKibben, MD, Sean P. Elliott, MD, MS, Ian W. Schwartz, MD, Jay Simhan, MD, Alex J. Vanni, MD, Rachel A. Moses, MD, MPH, *and* Jeremy B. Myers, MD, *Salt Lake City, Utah*

J Trauma Acute Care Surg
Volume 94, Number 2

Conclusions

In this prospective multi-institutional study of PFUI, EUR was not associated with a lower rate of urethral obstruction or need for urethroplasty when compared to SPT placement. Given the potential risk of EUR worsening injuries, clinicians should consider SPT placement as initial treatment for PFUI when simple retrograde cystoscopy is not successful in placement of a urethral catheter.

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Endoscopic Realignment is Dead (or close to dead)

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Obliterated posterior segments from PFUI warrant delayed urethral reconstruction – and <u>never</u> delayed endoscopic realignment (AUA Stricture Guidelines, #24)

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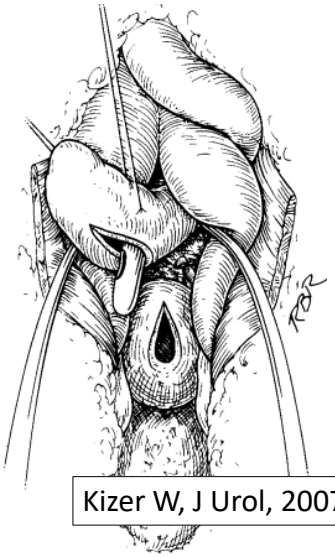
Posterior Urethroplasty Steps

Perineal

1. Urethral Mobilization
2. Corporal Splitting
3. Inferior Pubectomy
4. Urethral Rerouting

Recognize that #3 and #4 above rarely done in practice – but need to know steps for "gaining urethral length" for examinations



Kizer W, J Urol, 2007.

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The Journal of Urology

Urethral Reconstruction for Traumatic Posterior Urethral Disruption: Outcomes of a 25-Year Experience

Matthew R. Cooperberg,* Jack W. McAninch†, Nejd F. Alsikafi and Sean P. Elliott

From the Departments of Urology, University of California, San Francisco, San Francisco, California (MRC, JWM), Loyola University, Maywood, Illinois (NFA), and University of Minnesota, Minneapolis, Minnesota (SPE)

- 134 delayed posterior urethroplasty after trauma
- 115 (84%) -- no additional procedures
- 124 (93%) -- ≤1 VIU

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J Urol 2007

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Urotrauma: Conclusions

- Organ salvage increasingly achievable
- Multi-disciplinary evidence-based approach
- Timely interventions
- Interface with diagnostic and interventional radiology, trauma and orthopedic surgeons, plastic and reconstructive surgery

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Surgical Management of Male Incontinence

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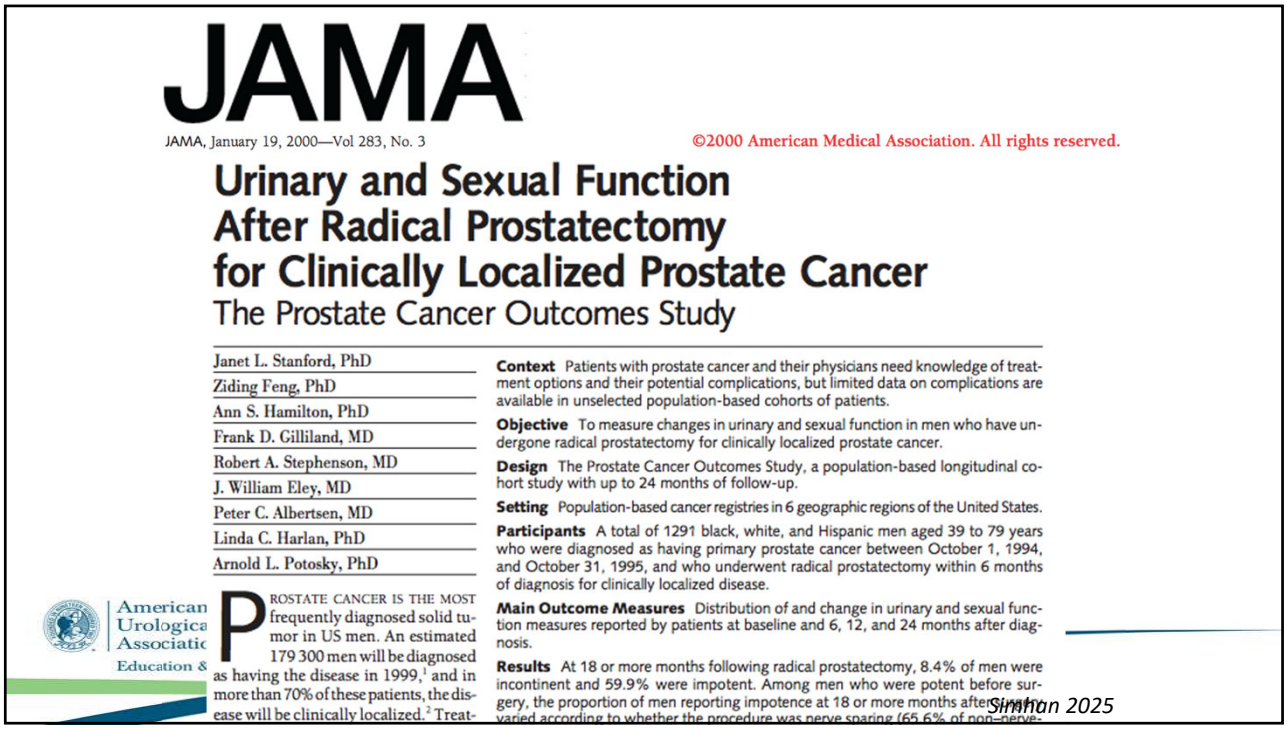

JAMA

JAMA, January 19, 2000—Vol 283, No. 3

Urinary and Sexual Function After Radical Prostatectomy for Clinically Localized Prostate Cancer

The Prostate Cancer Outcomes Study

Janet L. Stanford, PhD
Ziding Feng, PhD
Ann S. Hamilton, PhD
Frank D. Gilliland, MD
Robert A. Stephenson, MD
J. William Eley, MD
Peter C. Albertsen, MD
Linda C. Harlan, PhD
Arnold L. Potosky, PhD

Context Patients with prostate cancer and their physicians need knowledge of treatment options and their potential complications, but limited data on complications are available in unselected population-based cohorts of patients.

Objective To measure changes in urinary and sexual function in men who have undergone radical prostatectomy for clinically localized prostate cancer.

Design The Prostate Cancer Outcomes Study, a population-based longitudinal cohort study with up to 24 months of follow-up.

Setting Population-based cancer registries in 6 geographic regions of the United States.

Participants A total of 1291 black, white, and Hispanic men aged 39 to 79 years who were diagnosed as having primary prostate cancer between October 1, 1994, and October 31, 1995, and who underwent radical prostatectomy within 6 months of diagnosis for clinically localized disease.

Main Outcome Measures Distribution of and change in urinary and sexual function measures reported by patients at baseline and 6, 12, and 24 months after diagnosis.

Results At 18 or more months following radical prostatectomy, 8.4% of men were incontinent and 59.9% were impotent. Among men who were potent before surgery, the proportion of men reporting impotence at 18 or more months after surgery varied according to whether the procedure was nerve sparing (65.6% of non–nerve-

PROSTATE CANCER IS THE MOST frequently diagnosed solid tumor in US men. An estimated 179 300 men will be diagnosed as having the disease in 1999,[1] and in more than 70% of these patients, the disease will be clinically localized.[2] Treat-

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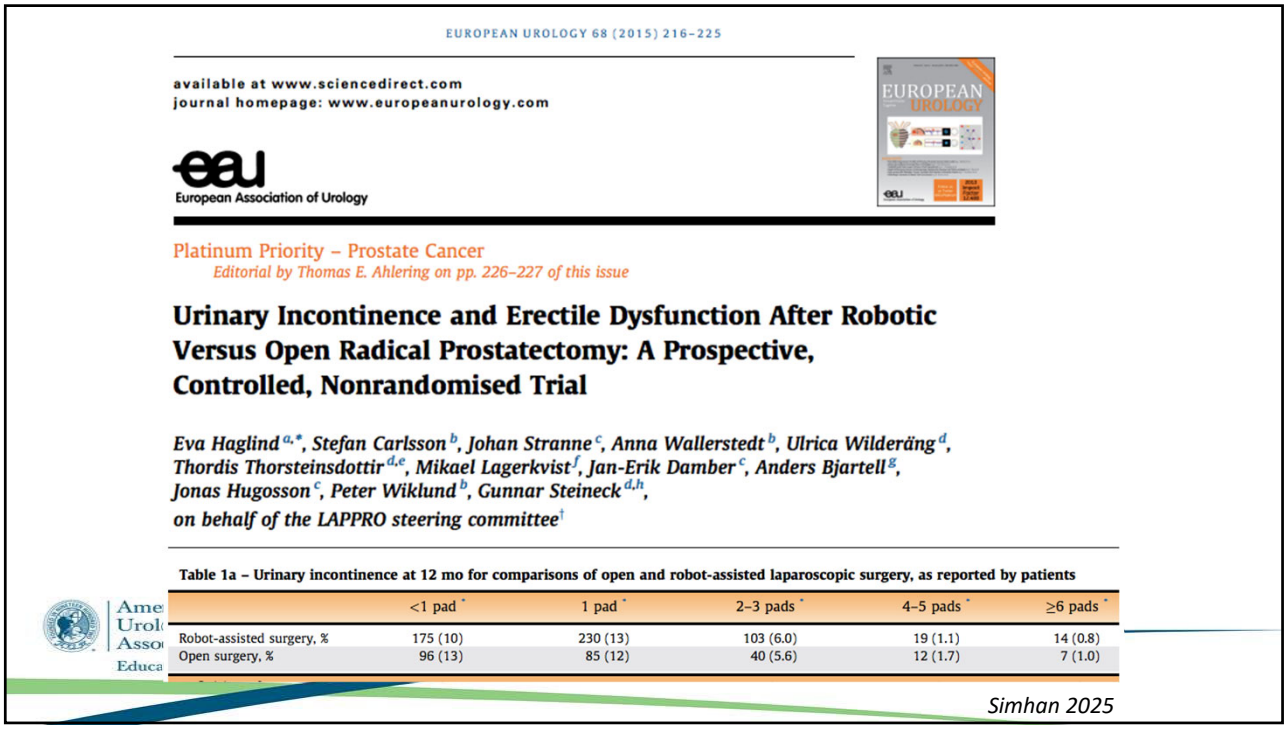

EUROPEAN UROLOGY 68 (2015) 216–225

available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Platinum Priority – Prostate Cancer

Editorial by Thomas E. Ahlering on pp. 226–227 of this issue

Urinary Incontinence and Erectile Dysfunction After Robotic Versus Open Radical Prostatectomy: A Prospective, Controlled, Nonrandomised Trial

Eva Haglind [a,], Stefan Carlsson [b], Johan Stranne [c], Anna Wallerstedt [b], Ulrica Wilderäng [d], Thordis Thorsteinsdottir [d,e], Mikael Lagerkvist [f], Jan-Erik Damber [c], Anders Bjartell [g], Jonas Hugosson [c], Peter Wiklund [b], Gunnar Steineck [d,h], on behalf of the LAPPRO steering committee [†]*

Table 1a – Urinary incontinence at 12 mo for comparisons of open and robot-assisted laparoscopic surgery, as reported by patients

	<1 pad *	1 pad *	2–3 pads *	4–5 pads *	≥6 pads *
Robot-assisted surgery, %	175 (10)	230 (13)	103 (6.0)	19 (1.1)	14 (0.8)
Open surgery, %	96 (13)	85 (12)	40 (5.6)	12 (1.7)	7 (1.0)

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Incontinence Management Is Controversial – But… There are Guidelines!

Incontinence after Prostate Treatment: AUA/SUFU Guideline

Jaspreet S. Sandhu, Benjamin Breyer, Craig Comiter, James A. Eastham, Christopher Gomez, Daniel J. Kirages, Chris Kittle, Alvaro Lucioni, Victor W. Nitti, John T. Stoffel, O. Lenaine Westney, M. Hassan Murad and Kurt McCammon

From the American Urological Association Education and Research, Inc., Linthicum, Maryland

0022-5347/19/2022-0369/0
THE JOURNAL OF UROLOGY®
https://doi.org/10.1097/JU.0000000000000314
Vol. 202, 369-378, August 2019
Printed in U.S.A.

These have been amended in 2024!!!

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Important Factors to Consider

- Etiology (prostate cancer, prostate surgery – TURP, etc)
- H/o radiation
- Degree of stress incontinence
- Degree of bother (IPSS)
- Presence of urge incontinence (?)

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Evaluation of SUI

9. Clinicians should evaluate patients with incontinence after prostate treatment with history, physical exams and *appropriate* diagnostic modalities to categorize severity of incontinence and degree of bother.

(Pad weight vs. pad count)

Correlation of Patient Perception of Pad Use with Objective Degree of Incontinence Measured by Pad Test in Men with Post-Prostatectomy Incontinence: The SUFU Pad Test Study

Victor W. Nitti,*,† Arthur Mourtzinos and Benjamin M. Brucker for the SUFU Pad Test Study Group

New York University Langone Medical Center, New York, New York, and Tufts Medical School (AM), Boston, Massachusetts

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Evaluation of SUI

14. Cysto – should be performed prior to index surgery.

15. UDS – optional prior to index surgery

**If anti-incontinence surgery already performed and recurrent SUI, then consider UDS

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Patient Selection Simplified

- Patient goals?
- Degree of bother?
- Pad Count ≥3
- Radiation History

The "worst of the worst" pt that is motivated and bothered tends to be a future AUS recipient

Don't forget, these patients could also have predominant urgency (in that case, follow OAB guidelines covered elsewhere)

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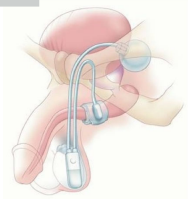
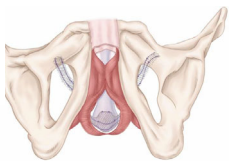
Treatment Options

Non-invasive:
Clamps
Pads

Invasive:
Urethral bulking agents
Adjustable Balloons
Sling
Artificial Urinary Sphincter





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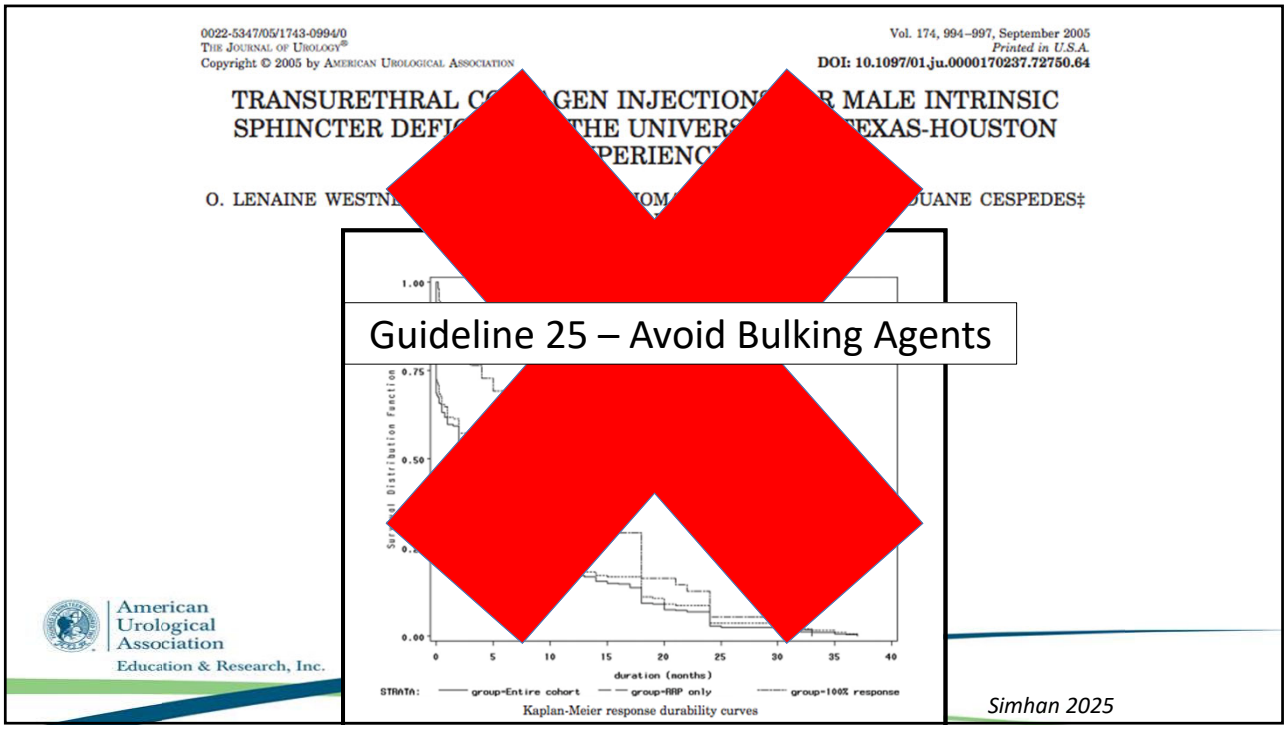

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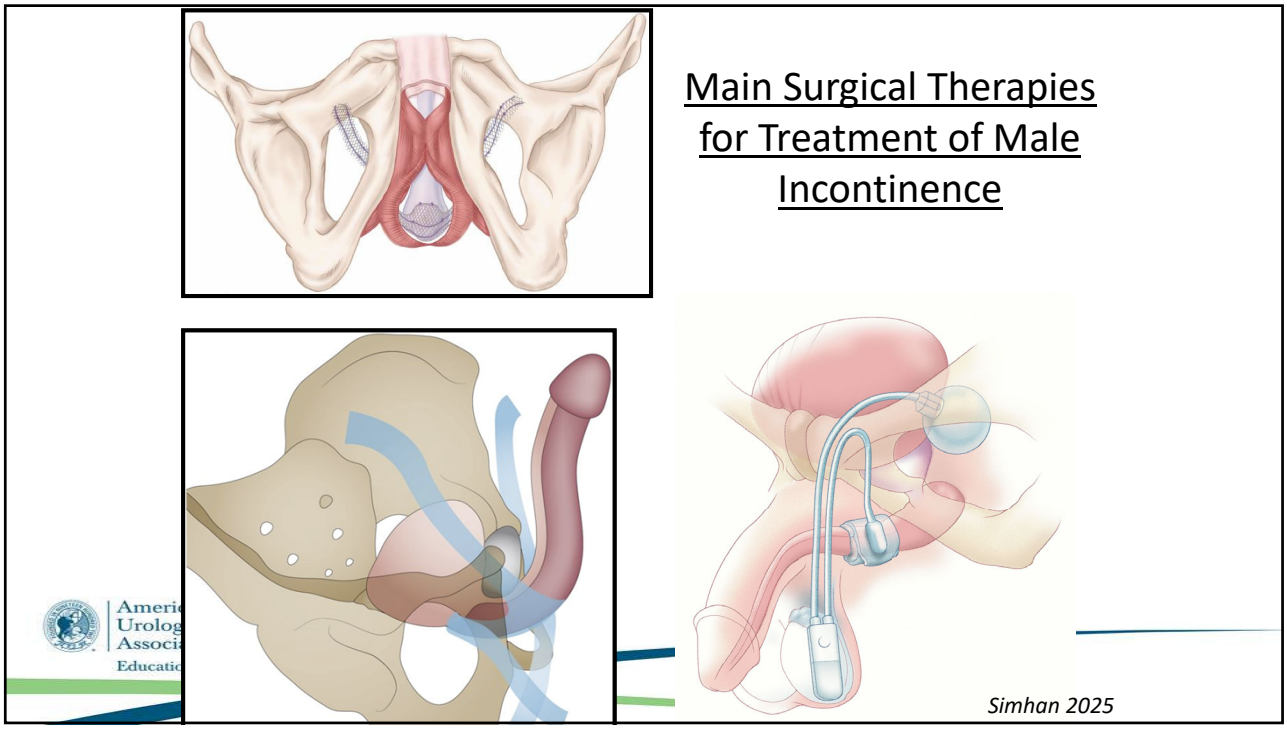

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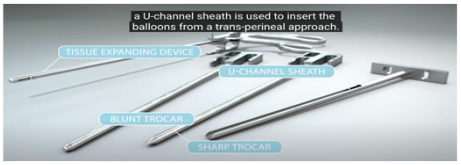
An Additional Passive Device

Adjustable Continence Therapy for Men



Clinicians may offer adjustable balloon devices to **non-radiated patients with mild to severe** SUI after prostate treatment.

(Conditional Recommendation; Evidence Level: Grade C)

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Treatment Reccs – Based on Guidelines (and Experience)

- AUS is first-line in radiated patients
- AUS is first-line in sling failures
- Sling is an option in mild/moderate **AND** non-radiated
- Adjustable continence balloons in non-radiated
- If sling fails, most will proceed to AUS

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AdVance Sling Erosion

Mostly described in the XRT patient – hence why guidelines are more insistent on AUS in radiated patients

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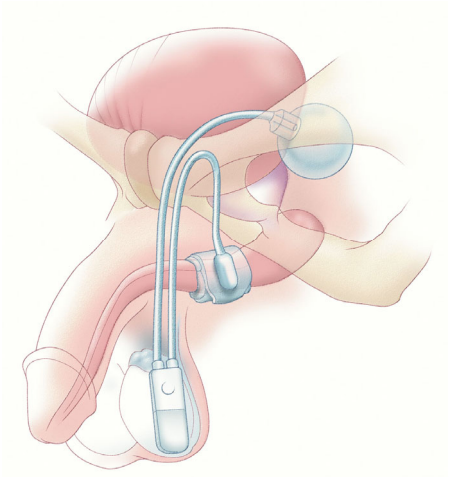
Artificial Urinary Sphincter



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Platinum Priority – Review – Incontinence
Editorial by Jaspreet S. Sandhu on pp. 690–691 of this issue

The Artificial Urinary Sphincter After a Quarter of a Century: A Critical Systematic Review of Its Use in Male Non-neurogenic Incontinence

Frank Van der Aa [a,], Marcus J. Drake [b], George R. Kasyan [c], Andreas Petrolekas [d], Jean-Nicolas Cornu [e],*
for the Young Academic Urologists Functional Urology Group

[a] Department of Urology, University Hospitals Leuven, Leuven, Belgium; [b] Bristol Urological Institute, Southmead Hospital, Bristol, UK; [c] Department of Urology, Moscow State University of Medicine and Dentistry, Moscow, Russia; [d] Department of Urology, Henri Dynant Hospital, Athens, Greece; [e] Department of Urology, Tenon Hospital, Assistance Publique-Hôpitaux de Paris, Pierre and Marie Curie University – Paris 6, Paris, France

Table 4 – Pooled analyses of artificial urinary sphincter outcomes

Outcomes	Results, % [range]	No. of included participants (no. of studies)
Infection/erosion	8.5 [3.3–27.8]	562 (10)
Mechanical failure	6.2 [2.0–13.8]	562 (10)
Urethral atrophy	7.9 [1.9–28.6]	456 (6)
Reintervention (for any reason)	26.0 [14.8–44.8]	549 (10)
No. of patients social continent (≤1 pad/24 h)	79.0 [60.9–100]	262 (7)
No. of patients completely dry (0 pads/24 h)	43.5 [4.3–85.7]	336 (7)

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EUROPEAN UROLOGY 63 (2013) 681–689

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Management of Artificial Urinary Sphincter Dysfunction

Frédéric Maillet, Jean-Marie Buzelin, Olivier Bouchot, Georges Karam*
Clinique Urologique, CHU Hôtel-Dieu, 44093 Nantes, France

European Urology
European Urology 46 (2004) 241–246

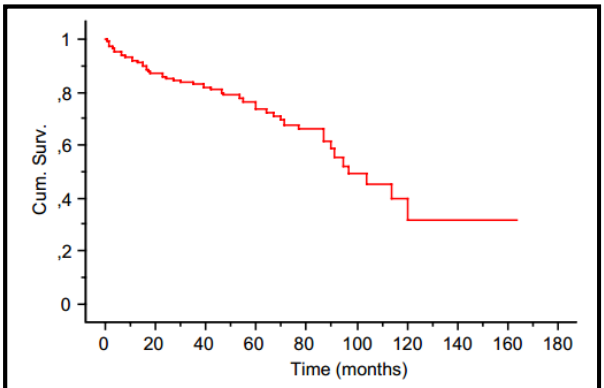

Fig. 5. Kaplan–Meier analysis of sphincters was based on the presence of at least one failure. The half-time failure was 8 years.

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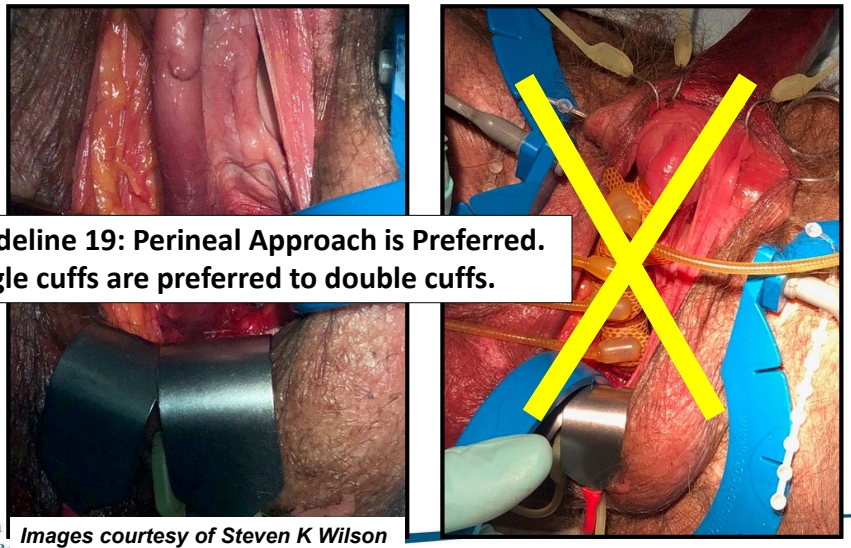
Where is the Best Place to Implant AUS Cuff?
Perineal >>>>> Penoscrotal



Guideline 19: Perineal Approach is Preferred. Single cuffs are preferred to double cuffs.

Images courtesy of Steven K Wilson

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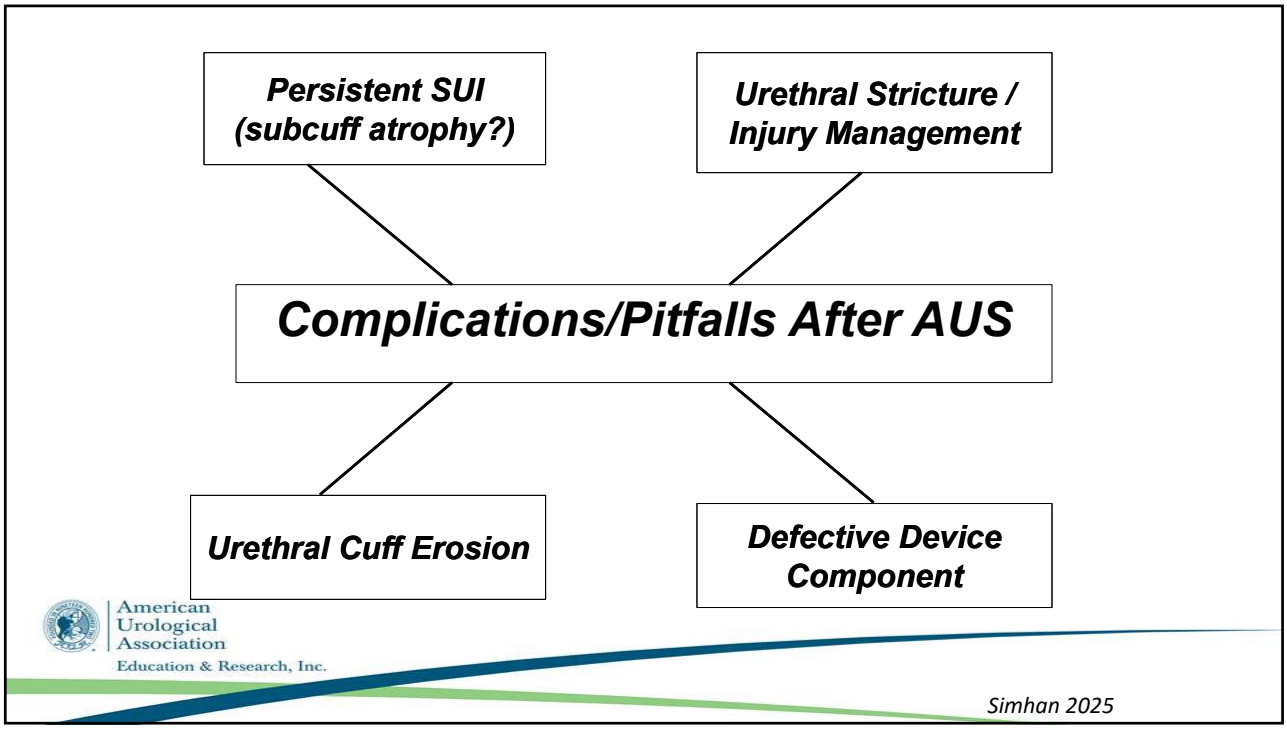

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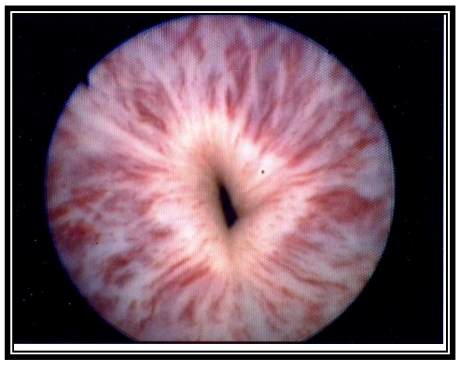
Reoperative AUS Surgery: Recurrent SUI

- *74 yrs old*
- *s/p AUS 4 years ago*
- *4.0 cm cuff*
- *Leaks 4 ppd*
- *History of XRT*



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Efficacy of Pressure Regulating Balloon Exchange in Men With Post Artificial Urinary Sphincter Persistent or Recurrent Stress Urinary Incontinence

Rachel A. Moses, Sorena Keihani, James R. Craig, Jacob Basilius, James M. Hotaling, Sara M. Lenherr, William O. Brant, and Jeremy B. Myers

- *22 patients*
- *PRB exchange for persistent SUI*
- *Decrease in avg PPD from 4.0 to 1.0*
- *Change to 71-80 cm H_20 balloon*
- *2 year delay in eventual revision*

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Cuff Location - Prior Penoscrotal AUS

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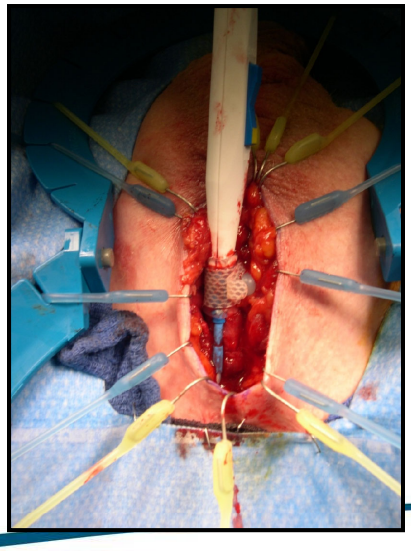
Cuff Relocated Proximally



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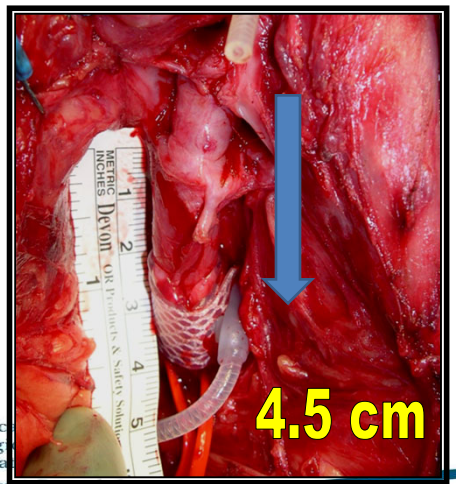
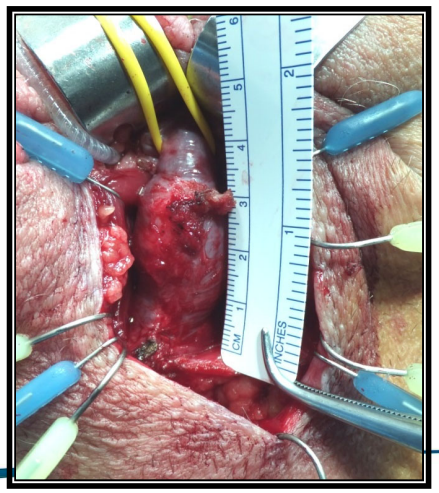
Perineal Incision→ Exposure to Proximal Bulb





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Device Revisions

- Can get imaging to see if PRB full.
  - If full, can tighten cuff / reposition it OR increase PRB balloon pressure
  - If empty, do complete device exchange (tandem cuff has risks)
- But, what if current cuff size is already small?

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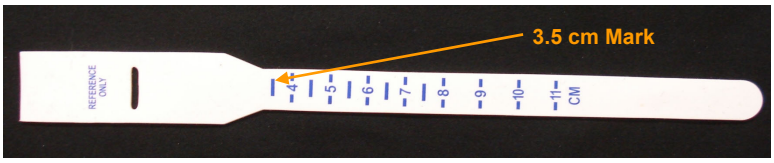
Does Cuff Size Matter?
Yes!

Accessory Kits

- Cuff Sizer updated with 3.5 cm marking



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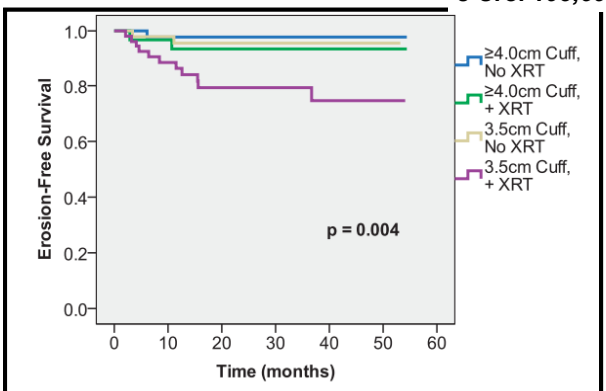
3.5 cm Artificial Urinary Sphincter Cuff Erosion Occurs Predominantly in Irradiated Patients

Jay Simhan, Allen F. Morey,*,† Nirmish Singla, Timothy J. Tausch, J. Francis Scott, Gary E. Lemack‡ and Claus G. Roehrborn

J Urol 193;593-597: 2015



Kaplan-Meier analysis of cuff erosion with time in irradiated vs nonirradiated cohorts with erosion-free survival stratified by AUS cuff size and radiotherapy (*XRT*) history.

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Mechanical failure rates of artificial urinary sphincter components: Is the 3.5-cm urethral cuff at higher risk?

Jeffrey C. Loh-Doyle MD | **Natalie Hartman MD** | **Azadeh Nazemi MS** | **Kevin Wayne PA** | **Leo R. Doumanian MD** | **David A. Ginsberg MD** | **Stuart D. Boyd MD**

Neurourology and Urodynamics. 2019;**38**:187–192. wileyonlinelibrary.com/journal/nau

TABLE 3 Cuff failures stratified by cuff size

	3.5-cm	4.0-cm	4.5-cm	5.0-cm
Number of failed cuffs that were a primary implant (*n*)	1	2	1	1
Number of failed cuffs that were a revision implant (*n*)	15	5	2	0
Number of failure incidents (*n*)	16	7	3	1
Total number placed (*n*)	166	314	325	50
Overall failure rate	9.64%	2.23%	0.92%	2.00%

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Pain, SUI, and Drainage 1 year After AUS

This is an AUS erosion. (scrotal swelling, fever, drainage, perineal pain)

Question stems often highlight risk factors for erosion

These include:
Radiation history,
Prior urethroplasty
"Tight" cuff (aka 3.5 cm)

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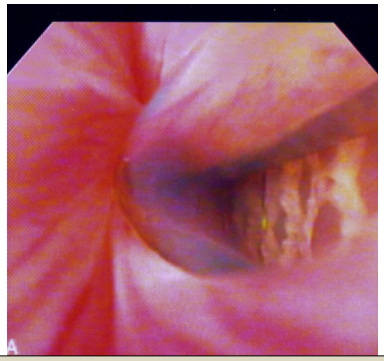
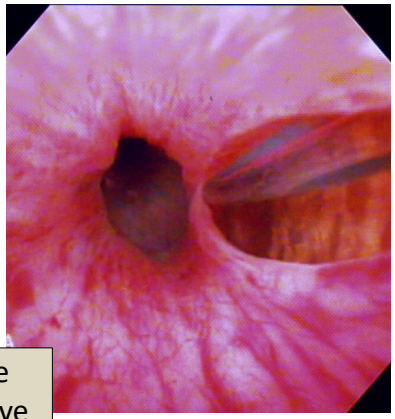
AUS Cuff Erosion Mandates Total Device Removal. How to Manage Urethra?

(Only do re-do AUS 3 mo later)





Guidelines give some leeway to suture urethra, perform urethroplasty, or leave long-term foley.

Must not replace AUS in same setting!

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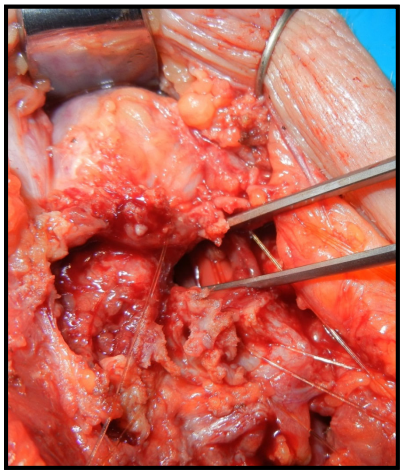
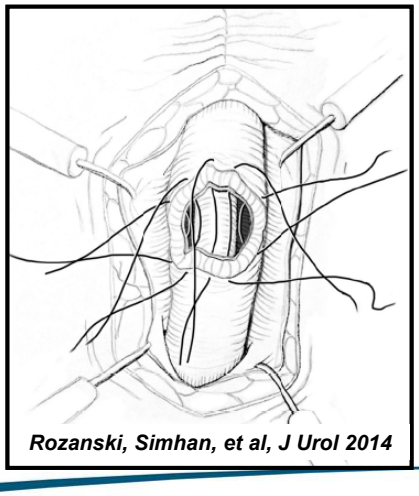
In the real world… this is a damage control procedure…





Rozanski, Simhan, et al, J Urol 2014

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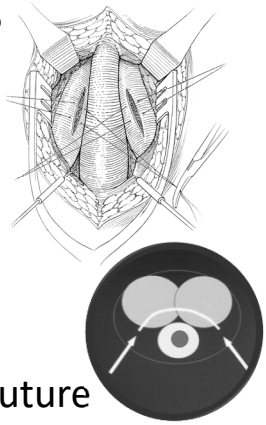
Transcorporal AUS

- Bailout strategy
- Use in post erosion cases or post-urethroplasty
- Adds “bulk” to urethra to mitigate future erosion risk (but compromises corpora for erections)



Transcorporal AUS is often not done in the index setting and only to add luminal “bulk” post-erosion or after numerous revisions.

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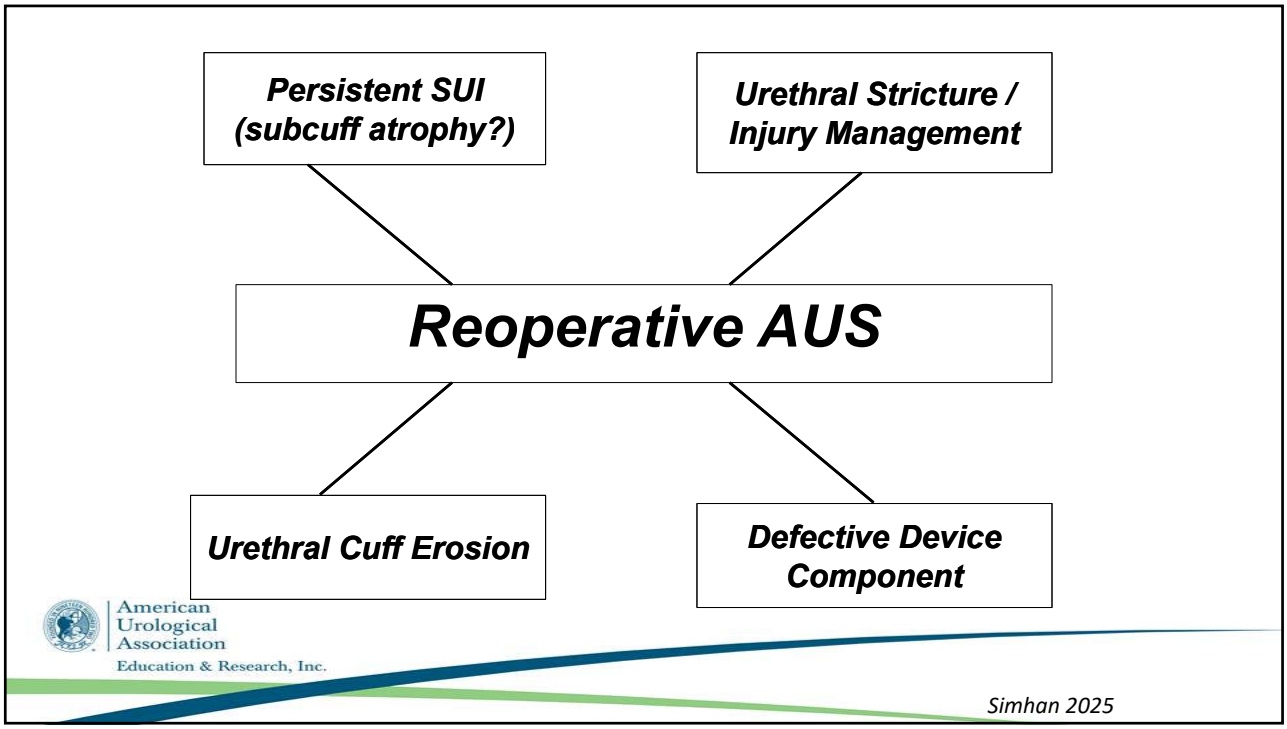

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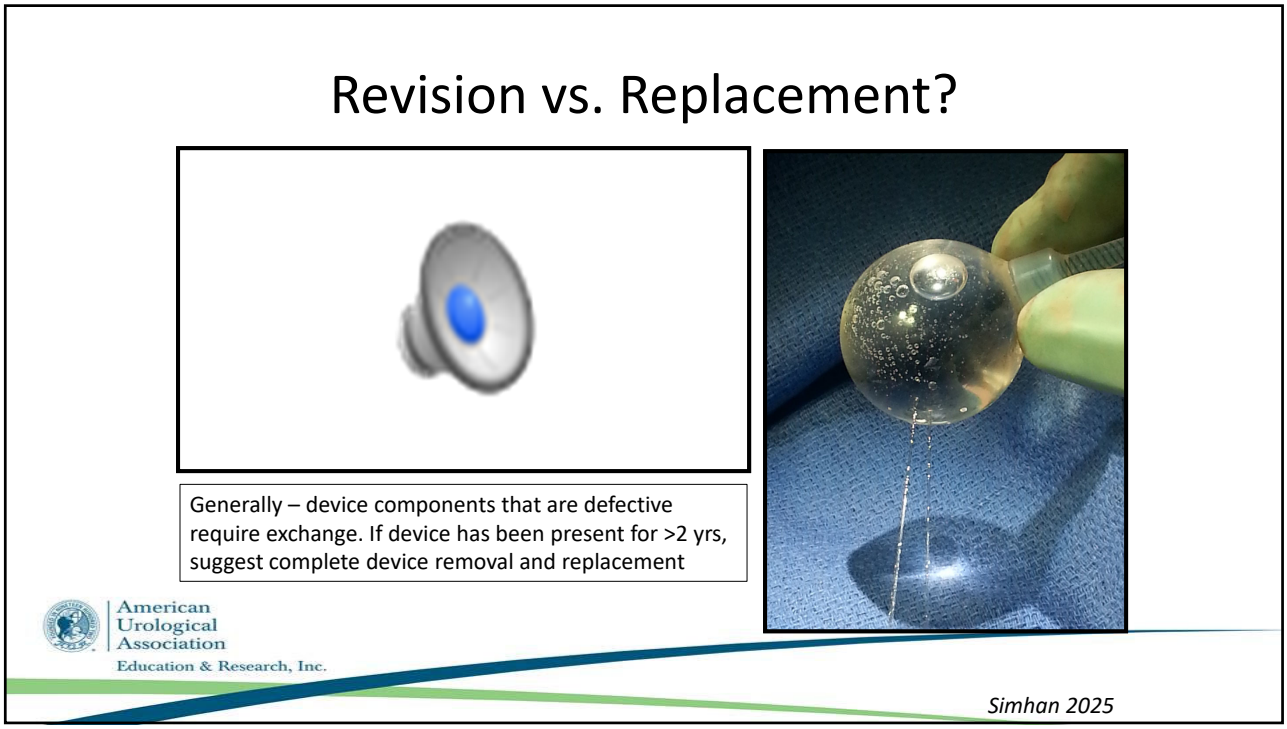

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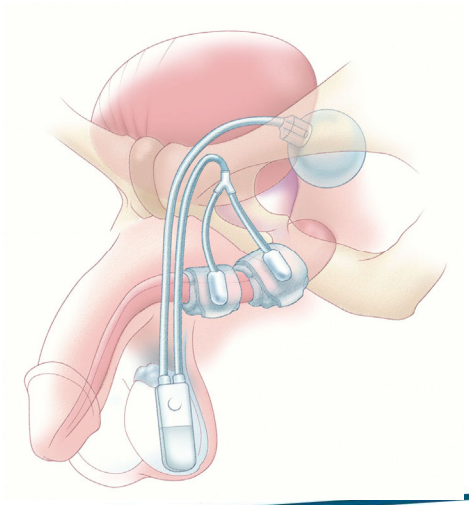
Tandem Cuff?



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Does Use of a Second Cuff Improve Artificial Urinary Sphincter Effectiveness? Evaluation Using a Comparative Cadaver Model

http://dx.doi.org/10.1016/j.juro.2015.06.102
Vol. 194, 1688-1691, December 2015
Printed in U.S.A.

Madeleine G. Manka* and E. James Wright

From The Brady Urological Institute, The Johns Hopkins University School of Medicine, Baltimore, Maryland

THE JOURNAL OF UROLOGY®

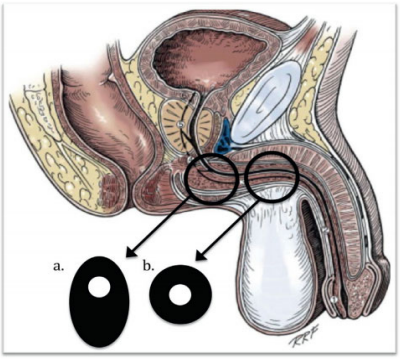

Figure 3. Transection schematic shows difference in tissue bulk between proximal (*a*) and distal (*b*) bulbospongiosus muscle. Modified from Jordan and McKammon.[7] Used with permission from Elsevier.

Figure 1. Measuring RLPP across tandem cuffs

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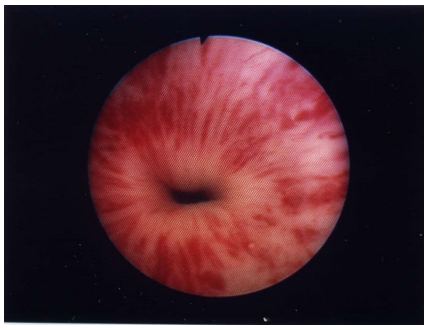
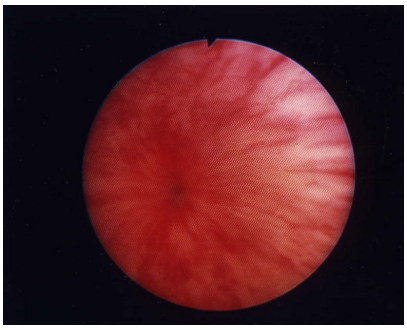
Which is Better?

Although some surgeons place tandems, the data supports it less

Pre-op: Tandem 4.5 cm cuff



Post-op: 4.0 cm cuff



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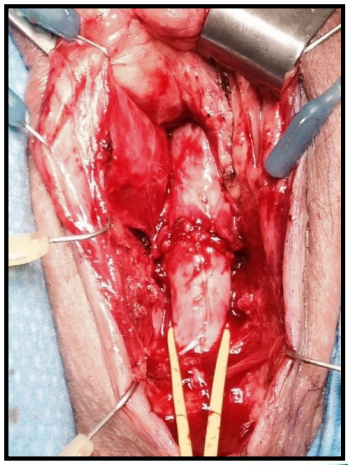
What if there is a urethral injury at the time of AUS dissection?



Urethral injuries can occur – but this mandates that the procedure is aborted and that the urethra is fixed.

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Persistent Incontinence After AUS Placement

Cystoscopy – assess the cuff for coaptation vs. erosion… THEN…

Urodynamics… THEN…

- Then – you should develop surgical plan (or treat OAB if urgency predominant!)
  - Move cuff to different position and re-size
  - Downsize cuff in same position
  - Add a cuff (we avoid at our center)

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Male Incontinence Closing Thoughts

- Injectables – rarely used
- Male Urethral sling
  - Sling position, patient selection (be selective)
- AUS – "Gold Standard"
  - Use perineal incision (Proximal cuff)
  - Small cuffs → erosions. Tandems → con'td incont.
  - Recurrent SUI? Downsize vs. reposition vs. PRB modification
  - Transcorporal cuff (reserve for erosions/prior urethral surgery)

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Good Luck!

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MCQ #1

A 27M sustains a renal injury after a MVC that involves the collecting system with urinary extravasation. Notably, the size of perinephric hematoma is 4.5 cm and the laceration occurs in the medial aspect of the kidney. The patient appears to be hemodynamically stable. Initial management should be:

A. OR for exploration with possible JJ stent
B. Angioembolization with possible PCN placement
C. Observation
D. JJ stent immediately followed by admission with observation of renal injury

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MCQ #2

A 49F sustains a 2 cm ureteral avulsion in the distal ureter. Best long term management is: :

A. Ureteroureterostomy
B. Ureteral reimplantation
C. Psoas hitch with ureteral reimplantation
D. Buccal graft ureteroplasty

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Question 3

A 32M sustains significant penile swelling and bruising with rapid detumescence following a traumatic masturbation event. He has not other complaints upon presentation. The appropriate next step is:

A. Urinalysis
B. Ultrasound
C. MRI
D. Operative exploration

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MCQ#4

A 24M with a history of hypospadias correction presents with an obliterated penile urethral stricture. Which operative technique is most preferred as an initial treatment?

A. DVIU
B. Excision with primary anastomosis
C. Ventral onlay urethral reconstruction
D. 2 Stage urethral reconstruction

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MCQ #5

An 18M falls off a ladder and sustains an open fracture of his tibia and a pelvic fracture. He presents to the emergency room with blood at the urethral meatus, abdominal pain from a palpable bladder, tachycardia, and hypotension. Retrograde urethrogram demonstrates a grade III urethral injury. In this setting, which option is the best urologic management?

A. Observation
B. One pass Foley attempt
C. Suprapubic tube placement
D. Operative realignment

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